FGC

Forest Genetics Council of British Columbia

Business Plan 2000/2001

FOREST RENEWAL BC

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Budgets list allocations of funds provided through the Forest Renewal BC Tree Improvement Program.

FOREST RENEWAL BC

Message from the Chief Forester

This is the first comprehensive Business Plan to be developed by the new Forest Genetics Council of British Columbia (FGC). Based on the fine work of the Interim Tree Improvement Council, the FGC and affiliated committees have worked hard to prepare this plan. I am pleased to note the balanced program, with a full range of activities including gene conservation, breeding, seed production, technical support, and extension. Also noteworthy is the development and implementation of GenSeed Ltd. as a stakeholder-owned and -controlled company to strategically increase the delivery of genetically selected seed and cutting materials to users. I am confident that GenSeed will become an effective and long-term player in British Columbia's forest genetics activities.

Gene conservation and stewardship of the genetic resource is a critically important activity, upon which the continued use and very existence of our forest resource depends. I am very pleased to see that Council is supporting the development of a Gene Conservation Centre at the University of British Columbia. This Centre will provide the technical expertise and baseline information needed to better organize gene conservation activities and to integrate them with other biodiversity initiatives.

Over the last several years the development and implementation of a formalized system of estimating seedlot genetic worth, and the integration of this information with timber supply analyses, is allowing better consideration of genetic gains in timber harvest level determinations. Long-term industry support for breeding and orchard activities requires a return on tree improvement investments. I believe that continued development of our analytical tools, and timber supply analyses that consider the long-term use of selected seed and estimated gains, will allow this positive investment return. This will increase the incentives for all stakeholders to participate in forest genetics activities, and increase the need for a dedicated and informed FGC.

During the last 3 years forest genetics and tree improvement have become a well-organized and integrated set of activities. The co-operative efforts of industry, government, and university stakeholders to develop and implement a business plan are highly commendable. Financial support from Forest Renewal BC has greatly assisted the process of plan development and program delivery.

I would like to thank the many participants of Council, Technical Advisory Committees and other affiliated committees for their hard work, patience and dedication to the effective management of our vitally important forest genetic resource. I look forward to the delivery of programs outlined in this Business Plan.

Larry Pedersen, RPF
Chief Forester
BC Ministry of Forests

Message from the FGC Co-Chairs

We are proud to present the 2000/01 Business Plan of the Forest Genetics Council of BC (FGC). Co-operators in the Council, its Technical Advisory Committees (TACs), Species Committees, and Review Committees have contributed significantly to both planning and program delivery. As a result of their efforts, and funding by Forest Renewal BC's Tree Improvement Program, we now look forward to a period of stability and of substantial progress towards meeting Council objectives.

This Business Plan covers seven subprogram areas with a comprehensive set of activities in gene conservation, tree breeding, seed production, technical support, and extension.

Highlights of the significant progress made during the last 3 years include:

- the formation of a new Gene Conservation TAC and, on its recommendation, the initiation of a Forest Gene Conservation Centre at the University of BC to provide a technical group capable of cataloguing the genetic resource of BC trees, and of supplying needed advice on *in situ* and *ex situ* conservation needs
- after two years in development, GenSeed is now ready to begin much needed seed orchard expansions
- formation of a new Extension TAC to identify needs and develop an extension and communications strategy.

Council's next challenges include further integrating the effects of Class A seed into timber supply reviews and allowable annual cut determinations, and advising on policy issues related to the production and use of genetically selected materials on the province's Crown forest lands.

We are confident that these issues will be resolved through the co-operative efforts of stakeholders.

On behalf of the FGC, we thank everyone who contributed to the work of the TACs, Species Committees, and Review Committees for their hard work over the last several years. We also thank Forest Renewal BC directors and staff for their continued support. During the coming year, we look forward to increased stability in program delivery, and continued alignment of effort towards meeting Council's objectives.

Shane Browne-Clayton, RPF
FGC Co-Chair
Industry

Dr. Dale Draper
FGC Co-Chair
Ministry of Forests

Budgets in this Business Plan were approved by the Forest Genetics Council of BC on March 12, 2000

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1.0 Introduction

This section overviews the relationship between the multi-stakeholder Forest Genetics Council, its co-operators, and Forest Renewal BC in the planning and implementation of forest gene resource management activities in British Columbia.

Section 2.0 outlines the process by which plans and budgets are developed for the FGC Business Plan.

Section 3.0 describes how the seven subprograms of the FGC Business Plan are planned and managed, and the major activities and budgets for each subprogram in 2000/01.

Section 4.0 identifies the agreements and administrative mechanisms by which the Forest Renewal BC Tree Improvement Program supports the FGC Business Plan.

Four appendices to the report include a summary of subprogram budgets, planning processes, and delivery mechanisms; a ranking of seed planning units (SPUs); Forest Genetics Council and committee members; and Species Plans for 42 SPUs in the province.

1.1 Forest Genetics Council of BC

The Forest Genetics Council of British Columbia (FGC), reorganized in November 1998 from the Coast and Interior Tree Improvement Councils, is a multi-stakeholder group representing the forest industry, Ministry of Forests (MoF), and universities. Council's mandate is to champion forest gene resource management in British Columbia, to oversee strategic and business planning for a co-operative provincial forest gene resource management program, and to advise the Chief Forester on forest gene resource management policies.

The FGC provides a forum for stakeholder representatives to set goals and objectives and to oversee the development and delivery of a Business Plan to fulfill them.

As stated in its 1998 Strategic Plan, Council's goal is:

To maximize the economic benefits from tree improvement investments for gains in wood quality, quantity and pest tolerance consistent with strategic land use planning by:

1. Managing a gene conservation program to maintain genetic diversity in commercial tree species.
2. Identifying and funding the long-term production capability required to meet approved Business Plan priorities.
3. Doubling the average volume gain of genetically improved seed[1] produced from 6% to 12% by 2007.
4. Increasing genetically improved seed use to 75% of total provincial sowing by 2007.

[1] "Genetically improved" refers to seed that comes from tree breeding programs that select from wild stands the trees with superior characteristics for growth, strength, or pest-resistance. "Seed" as used here refers to all improved reforestation materials, including vegetative propagules. The Forest Genetics Council does not support research on genetic engineering, and no genetically modified materials are used in Crown land reforestation in British Columbia.

5. Monitoring progress in all aspects of gene resource management.

The FGC Business Plan defines the annual set of activities and associated budgets to achieve these objectives.

1.2 A Co-operative Effort

Forest gene resource management is a co-operative effort. In broad terms, the MoF leads tree breeding activities and private industry leads operational production of reforestation materials. The Canadian Forest Service, MoF Research Branch, and universities undertake research supporting tree improvement, while private institutions focus on applied research related to operational production.

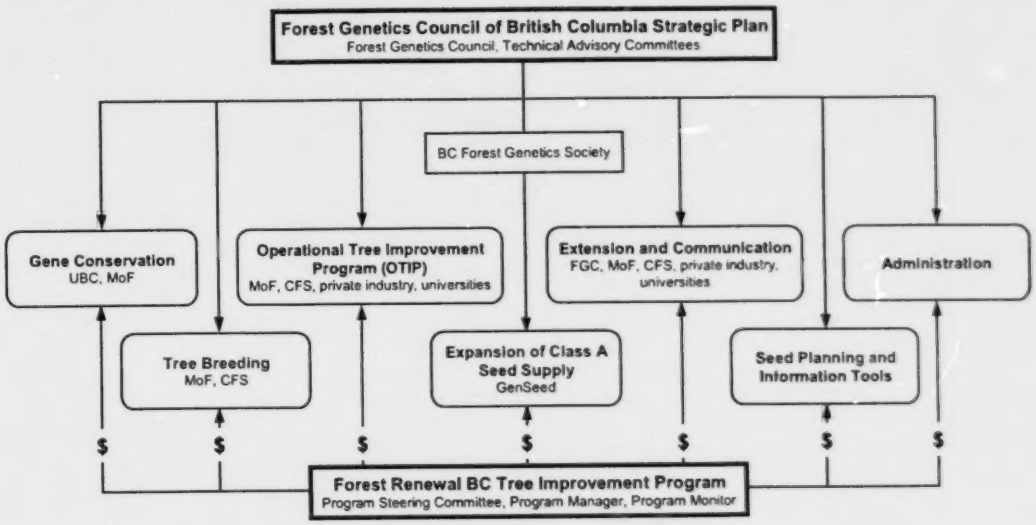
1.3 Forest Renewal BC Tree Improvement Program

Forest Renewal BC is the major funding agency for forest gene resource management in British Columbia. Through its Tree Improvement Program (TIP), Forest Renewal finances Council's work and those activities in the FGC Business Plan that meet Forest Renewal's objectives. MoF and private industries also fund tree improvement activities under Council's Business Plan.

The goals of Forest Renewal's TIP are to increase the growth rate, wood quality, and pest resistance of seedlings, and to preserve the genetic diversity of tree species across the province. As shown in Figure 1, the TIP is consistent with the provincial strategy for forest gene resource management developed by the FGC. The Forest Renewal TIP is incremental to existing government and industry tree improvement activities, and Forest Renewal Funds are tracked through the Corporation's Investment Management System.

TIP budget allocations from Forest Renewal BC are based on a 10-year funding proposal put forward by the FGC, and on annual recommendations from the FGC. Annual budget allocations are subject to Forest Renewal BC budgeting processes and approvals.

Figure 1 **Relationship between FGC Strategic Plan, Forest Renewal BC TIP, and participants in various forest gene resource management areas**



The 2000/01 FGC Business Plan details specific projects and spending for the seven subprograms of the Forest Renewal TIP.

2.0 Process for Business Plan Development

This section outlines the link between FGC objectives, planning processes, and the FGC Business Plan.

2.1 The Role of Council and its TACs

FGC members, representing the Ministry of Forests (MoF), Forest Renewal BC, forest companies, and universities, provide strategic direction to the provincial forest gene resource management program. FGC Technical Advisory Committees (TACs) provide technical and policy information to Council and contribute to the development of FGC plans and associated budgets. The FGC Business Plan consolidates the subprogram plans and budgets into a comprehensive package that addresses Council's objectives and maximizes the economic benefits from tree improvement.

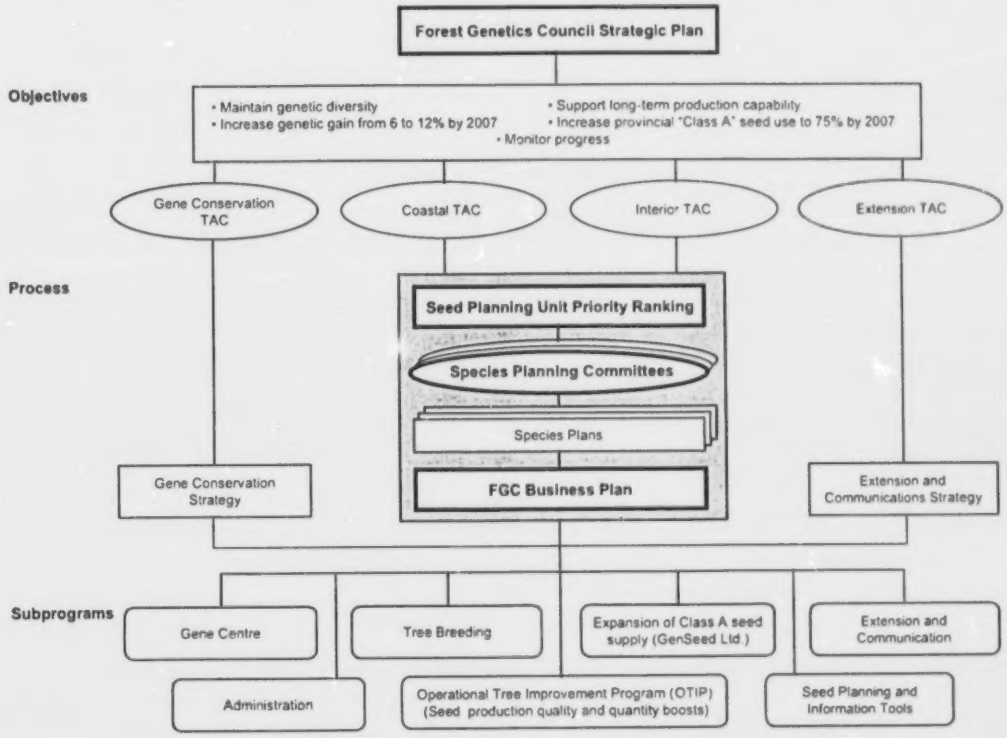
Council's four TACs lay the groundwork for the FGC Business Plan:

- The Gene Conservation TAC (GCTAC) advises Council on issues related to gene conservation and genetic diversity, and identifies required activities and budgets under the Gene Conservation Subprogram.
- The Coastal and Interior TACs, through their Species Committees, prepare Species Plans (Appendix 4) that form the basis of the Tree Breeding, Operational Tree Improvement Program (OTIP), and Expansion of Class A Seed Supply (GenSeed Ltd.) subprograms.
- The Extension TAC (ETAC) is responsible for developing a strategy and annual activity plan for the Extension and Communication Subprogram.

The MoF Tree Improvement Branch, through the Seed Information Systems Steering Committee, oversees the development of activities and budgets for the Seed Planning and Information Tools Subprogram. The FGC and FGC Program develop the activities and budgets for the Administration Subprogram.

Council reviews all strategies, plans, or recommendations from the TACs or other agencies for approval (or revision) before incorporating them into the FGC Business Plan. Figure 2 illustrates this hierarchical structure and the link between FGC objectives, planning processes, development of the FGC Business Plan, and the seven subprograms through which it is implemented.

Figure 2 The link between FGC objectives, planning processes, and the FGC Business Plan



The process by which the Council Subcommittees or other agencies define activities and budgets for each subprogram is discussed in Section 3. Since it is often difficult to accurately predict project spending, the management authorities for each subprogram are authorized to reallocate funds within their subprograms as necessary throughout the fiscal year, subject to limits and review processes.

3.0 Subprogram Planning and Management

This section describes how subprograms are planned and managed, and the major activities and budgets for each subprogram in 2000/01. Appendix 1 contains a summary of subprograms and budgets for the 2000/01 FGC Business Plan.

3.1 Gene Conservation Subprogram

Gene conservation is a fundamental element of the FGC Strategic Plan. Gene conservation activities protect the gene pool needed for species to adapt to future environmental conditions, and ensure that genetic resources are maintained for future generations.

3.1.1 Planning

Gene conservation activities are developed through the FGC Gene Conservation TAC (GCTAC). During 1999, the GCTAC produced a report outlining specific objectives and an approach for gene conservation program delivery that was subsequently accepted and approved by the FGC.

The University of BC (UBC) Faculty of Forestry, in consultation with the GCTAC, submitted a proposal to the FGC for the formation of a Forest Gene Conservation Centre to provide expertise, research, and strategic planning related to gene conservation and to evaluate levels of protection of genetic diversity. The proposal, which was approved in March 2000, forms the basis for funding and business activities in the Gene Conservation Subprogram in 2000/01.

3.1.2 Management

Forest Renewal BC spending on gene conservation will be directed through a Contribution Agreement with UBC.[2] Significant adjustments in technical objectives or budgets must be approved by the GCTAC; minor adjustments will be the responsibility of the Forest Gene Conservation Centre Program Leader at UBC.

3.1.3 Activities and Budget

The Forest Gene Conservation Centre will help to identify specific *in situ* and *ex situ* conservation needs and strategies to address these needs, and will assist with forest certification issues as they relate to gene conservation. It will also allow the leveraging of funds with other national and international agencies.

In the 2000/01 fiscal year, the Centre will receive $183,700 for staffing, strategy development, and the initiation of several long-term projects to investigate and catalogue the genetic diversity of forest trees in B.C. Table 1 outlines a 7-year budget plan for the Centre's Forest Renewal-funded activities. In-kind contributions from UBC will include staff time, lab and office space, and other support. Industry and MoF contributions will include staff time and other logistical support for specific projects.

[2] This agreement was not finalized at the time of this writing.

Table 1 **Forest Gene Conservation Centre (FGCC) budgets (2000 to 2007) listed by project and fiscal year. Budgets include Forest Renewal BC - funded activities only.**

Project	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Theor. framework document(s)	30,000	15,000	10,000				
Genetic issues in certification	15,000	14,000	10,000				
Cataloguing /documenting protection	20,000	30,000	35,000	40,000	30,000	30,000	30,000
Sampling strategies and SPZs	35,000	35,000	30,000	30,000			
Markers/Theory for Diversity meas.		30,000	35,000	35,000	35,000	35,000	
Whitebark pine diversity and cons.	33,000	19,000	20,000	20,000	20,000		
Genetic structure of minor species		20,000	20,000	30,000	30,000	35,000	40,000
Other expenses							
Research associate	30,000	60,000	61,800	63,654	65,563	67,531	69,556
Extension	4,000	4,000	5,000	5,000	5,000	5,000	5,000
Contingency fund					40,000	50,000	75,000
Subtotal	167,000	227,000	226,800	223,654	225,564	222,531	219,556
5% FGCC expenses	8,350	11,350	11,340	11,183	11,278	11,127	10,978
5% UBC overhead	8,350	11,350	11,340	11,183	11,278	11,127	10,978
Total	**183,700**	**249,700**	**249,480**	**246,019**	**248,120**	**244,784**	**241,512**
						Total	**1,663,315**

3.2 Tree Breeding Subprogram

The Tree Breeding Subprogram focuses on the continued improvement of seed and vegetative materials for reforestation. Tree breeding activities include selecting parents in wild stands, propagation, testing offspring, mating, establishing/maintaining/measuring trials, and technical support. The Subprogram also includes applied genecology work by MoF geneticists to support the information needs of seed planning unit[3] (SPU) programs as described in Species Plans.

3.2.1 Planning

FGC Interior and Coastal TACs and their associated Species Committees carry out planning for the Tree Breeding Subprogram. Committees estimate seed demand, production capacity, and genetic gain for each of the 11 commercial tree species breeding programs; rank SPUs for investment; develop strategies for priority SPUs; and prepare Species Plans consistent with the SPU strategies.

The budget for the Tree Breeding Subprogram is based on Species Plan budgets developed by the Manager of Forest Genetics, MoF Research Branch, with input from MoF tree breeders, species committees, the FGC Program Manager and the Director, MoF Tree Improvement Branch.

3.2.2 Management

MoF manages the Tree Breeding Subprogram activities and reports to the FGC. The Manager of Forest Genetics has authority for project re-allocations in support of FGC objectives. Re-allocations of funds between seed planning units or from breeding activities to technical support

[3] Seed planning units – groupings by species, seed zone, and elevation band – form the basis for tree breeding and seed production planning.

activities require the approval of the Director, Tree Improvement Branch and the FGC Program Manager.

3.2.3 Activities and Budget

The 2000/01 budget for the Tree Breeding Subprogram is $2,350,000. Table 2 contains approved budgets and key performance indicators (KPI) for breeding activities by SPU. Additional projects are risk-managed on the assumption that some planned work will not proceed due to unforeseen limitations.

3.3 Operational Tree Improvement Program (OTIP)

The OTIP supports the FGC objectives to increase the quality and quantity of Class A seed produced from existing forest company and MoF seed orchards. It also provides technical support for orchard production and management, including pest management.

3.3.1 Planning

OTIP spending is based on two sources of input:

- Species Plans developed by the Interior and Coastal TACs and their Species Committees
- a call for proposals to increase the quality and quantity of seed and vegetative material for reforestation.

FGC Review Committees review and rank all proposals against FGC objectives and SPU priorities, technical quality and cost. OTIP projects are selected to increase the genetic gain in seed made available for reforestation and to increase the quantity of seed produced from existing orchards. They support FGC short-term objectives for gains in growth rate, pest resistance, and wood quality, and long-term objectives of replacing trees in existing seed orchards with trees of higher genetic value. The total budget allocation for OTIP is recommended by the FGC to Forest Renewal BC.

3.3.2 Management

The MoF Tree Improvement Branch administers OTIP on behalf of the FGC. The program is "risk-managed" by allocating more funding to projects than the total OTIP budget. Requests for Fund re-allocation or new funding requests are handled by the MoF Tree Improvement Program Administrator in consultation with the appropriate TAC and the FGC Program Manager. All projects report on key performance indicators to enable tracking of the planned activities.

3.3.3 Activities and Budget

The 2000/01 OTIP budget is $1,545,000; an additional $67,000 is risk-managed. Table 3 contains approved OTIP budgets and KPI for all SPUs.

Table 2 **2000/01 budgets and KPI by SPU for tree breeding and associated technical support activities. See Species Plans in Appendix 4 for more detail. Category numbers relate to Work Breakdown Structure (Figure 5).**

Seed planning Unit				211		221		222		231		232		233		234		235		240-1		240-2		240-3		240-4		
				Fam. select		Breed arb.		Mating		Test design		Test establish.		Test maint.		Test measure		Test analyze		Technical support								Total
	Spp.	SPZ	Elev	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	KPI	$$	$$
1	Fd	M	0-700											6	48,362					2	36,271							84,633
2	Cw	M	0-600					150	18,059			4	170,000	12	42,000					4	13,000	1	28,000	150	88,000	1	23,000	382,059
3	Hw	M	0-600	107	1,000			800	4,000			4	63,000	40	28,000	11	29,030	9	1,000	120	10,000	1	25,000	1	30,000	1	18,000	207,030
4	Sx	NE	<1300					20	2,000					5	45,481	3	13,000											60,481
5	Sx	NE	1300-1700					20	2,000					5	8,000	3	10,600											20,600
6	Ss	M	0-750	60	34,000	400	19,325	400	15,000			6	57,000	30	45,000	6	12,000			1	40,000	1	25,000	1	9,000			256,325
7	Pli	NE	<1400					65	26,000											1	11,437							37,437
8	Pw	CST.	0-1000	48	8,000	200	14,535	400	34,000			4	34,000	20	70,000	12	34,000	3	6,000	1	82,000	1	10,000					292,535
9	Ba	all	0-700									4	43,588	2	35,000													78,588
10	Pli	TO	<1400					35	11,595											6	30,000	1	14,000					55,595
11	Yc	M	400-1200			400	15,668					1	13,000	16	41,000					2	12,000	3	33,000	6	28,000			142,668
12	Pli	PG	<1100																	6	58,156							58,156
13	Lw	NE	<1300			100	17,510																					17,510
14	Sx	PG	<1200					40	5,931					6	46,000	3	40,000											91,931
15	Pw	INT	<1400m											4	5,731													5,731
16	Pli	TO	>1400																									0
17	Pli	BV	<1200					35	12,500			2	12,445															24,945
18	Pli	CP	<1000																									0
19	Fd	SM	200-1000																	6	12,877	1	94,000	5	37,000			143,877
20	Pli	NE	>1400																									0
21	Fd	NE	<1000					50	6,027					4	30,000	4	30,000			3	1,500	3	1,500	1	18,000			87,027
22	Fd	NE	>1000					50	4,120																			4,120
23	Sx/Ss	SM/NST	all									12	55,848															55,848
24	Hw	M	600+	8	1,000			400	4,000					5	8,420			3	1,000									14,420
25	Sx	EK	<1700					20	2,708					4	24,000	1	12,000											38,708
26	Pli	PG	>1100																									0
27	Cw	SM	200-1000									2	12,480	2	4,000													16,480
28	Sx	TO	1300-1850					20	3,000					2	9,000	2	24,289											36,289
29	Pli	EK	>1400																									0
30	Sx	TO	<1300					20	2,966					2	32,000	2	11,000											45,966
31	Fd	M	700+											2	6,200					1	5,130							11,330
32	Pli	EK	<1400									3	19,384															19,384
33	Cw	M	600+									1	8,200	2	4,160													12,360
34	Lw	EK	800-1500											8	42,044	8	39,000											81,044
35	Sx	BV	<1200					10	1,000					3	19,600													20,600
36	Bg	M	0-700																	1	9,270							9,270
37	Fd	QL	all					20	4,120																			4,120
38	Hw	M	0-600																									0
39	Fd	EK	all																	200	17,510							17,510
40	Sx	PR	<1200									5	12,000	4	36,385													48,385
41	Fd	PG	all																									0
42	Sx	PG	>1200																									0
43	Fd	CT	all					40	16,480																			16,480
			Total	223	44,000	1,100	67,038	2,595	175,506	0	0	48	500,945	184	530,383	55	254,919	15	8,000		339,151		230,500		210,000		39,000	$2,499,442
																											Risk Managed Amount	($149,442)
																											Breeding Budget	$2,350,000

Table 3 2000/01 budgets and KPI by SPU for OTIP projects.
See Species Plans in Appendix 4 for more detail. Category numbers relate to Work Breakdown Structure (Figure 5).

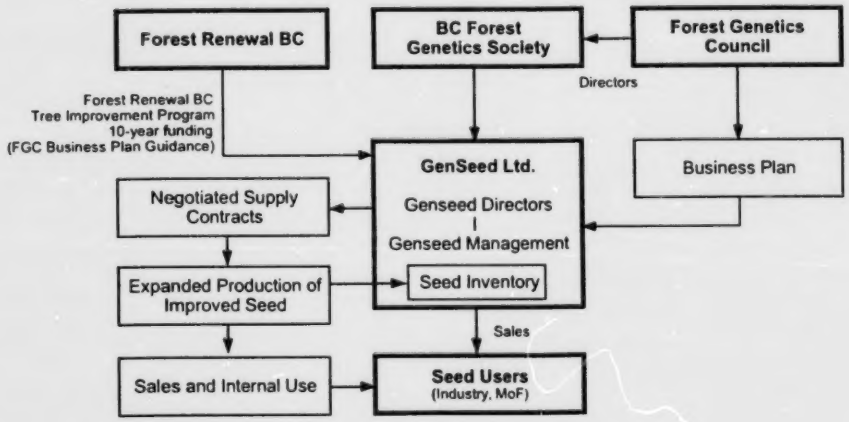
Seed Planning Unit				320 – Quality / quantity boosts							340 – Pest management				350 – Tech. support		
				321	322	323	324	325	326		341	342	343				
				Rpl. grsft.	Rpl. Rmt.	Rogung	SMP/CP	Induction	Orch. mgt.		Insect cntr.	Dise. cntr.	Monitoring		# of		Total
#	Spp.	SPZ	Elev (m)	KPI	KPI	KPI	KPI	KPI	KPI	$	KPI	KPI	KPI	$	projects	$	$$
1	Fd	M	0-700	2400	900	0	1094	540	2616	61,733	0	0	0	-	2	67,687	129,420
2	Cw	M	0-600	0	35	0	1359	1031	6291	38,274	559	0		8,382	4	101,726	148,382
3	Hw	M	0-600	1027	463	0	458	170	100	40,167	1877	0	0	6,833	6	121,546	168,546
4	Sx	NE	<1300	400	50	400	289	0	2501	11,151	2249	0	2349	42,343	5*	97,205	150,699
5	Sx	NE	1300-1700	400	0	400	245	0	2218	9,635	1987	0	1987	6,445	1*	5,000	21,080
6	Ss	M	0-750	0	0	0	0	0	131	1,725	0	0	131	1,724	1	33,267	36,716
7	Pli	NE	<1400	0	0	0	1916	0	1866	14,918	1756	0	0	4,158	6*	144,142	163,218
8	Pw	CST.	0-1000	1820	1500	0	1100	0	1459	32,710	0	300	0	4,158	2	61,907	98,775
9	Ba	all	0-700	0	0	0	300	300	2230	14,685	2230	0	0	4,895		-	19,580
10	Pli	TO	<1400	0	0	0	5566	0	0	9,149	0	0	0	-	5	176,600	185,749
11	Yc	M	400-1200	0	6900	0	0	100	14410	49,243	11910	0	0	690	2	31,815	81,748
12	Pli	PG	<1100	293	0	0	5840	0	901	12,243	4389	4389	3120	19,327	2	7,497	39,067
13	Lw	NE	<1300	173	73	0	703	484	1598	9,235	1598	0	0	365	1	3,500	13,100
14	Sx	PG	<1200	0	100	595	800	1850	935	18,875	8989	8987	346	16,918	4	102,271	138,064
15	Pw	INT	<1400m	0	95	0	1981	100	3235	9,113	2822	0	2822	6,076	1	4,515	19,704
16	Pli	TO	>1400	0	400	0	582	0	146	14,374	582	582	0	2,277	1	37,905	54,556
17	Pli	BV	<1200	133	0	0	8550	0	283	15,203	5850	5850	1506	8,837	2	6,366	30,406
18	Pli	CP	<1000	219	0	0	710	0	219	4,699	4300	4300	1160	4,699	2	4,017	13,415
19	Fd	SM	200-1000	0	0	0	0	150	3083	11,731	0	0	0	-	0	-	11,731
20	Pli	NE	>1400	0	0	0	0	0	0	-	0	0	0	-	0	-	-
21	Fd	NE	<1000	0	0	0	0	0	0	-	0	0	0	-	1*	5,000	5,000
22	Fd	NE	>1000	0	0	0	0	0	0	-	1512	0	1512	984	0	-	984
23	Sx/Ss	SM/NST	all	0	0	0	0	0	0	-	0	0	0	-	0	-	-
24	Hw	M	600+	0	0	0	0	0	0	-	0	0	0	-	0	-	-
25	Sx	EK	<1700	0	100	500	0	0	1827	5,426	1655	0	1655	3,617	0	-	9,043
26	Pli	PG	>1100	0	0	0	0	0	0	-	0	0	0	-	0	-	-
27	Cw	SM	200-1000	0	0	0	0	100	0	19,110	0	0	0	-	0	-	19,110
28	Sx	TO	1300-1850	300	252	263	1054	500	0	22,248	1904	0	0	1,946	0	-	24,194
29	Pli	EK	>1400	0	0	0	0	0	0	-	0	0	0	-	0	-	-
30	Sx	TO	<1300	0	0	0	0	0	0	-	0	0	0	-	0	-	-
31	Fd	M	700+	0	0	0	0	0	0	-	0	0	0	-	0	-	-
32	Pli	EK	<1400	0	0	0	0	0	0	-	0	0	0	-	0	-	-
33	Cw	M	600+	0	0	0	0	0	0	-	0	0	0	-	0	-	-
34	Lw	EK	800-1500	68	27	0	1168	771	2431	4,370	2431	0	0	1,456	0	-	5,826
35	Sx	BV	<1200	0	0	300	363	650	769	9,171	666	0	666	3,868	1	2,000	15,039
36	Bg	M	0-700	0	0	0	0	0	0	-	0	0	0	-	0	-	-
37	Fd	QL	all	0	0	0	100	0	0	1,033	351	351	0	850	1	400	2,283
38	Hw	M	0-600	0	0	0	0	0	0	-	0	0	0	-	0	-	-
39	Fd	EK	all	0	0	0	0	0	0	-	0	0	0	-	0	-	-
40	Sx	PR	<1200	0	0	0	0	0	0	-	0	0	0	-	0	-	-
41	Fd	PG	all	0	0	0	100	0	0	678	540	540	0	1,050	1	400	2,128
42	Sx	PG	>1200	0	0	0	0	0	0	-	0	0	0	-	0	-	-
43	Fd	CT	all	0	0	0	200	0	0	2,238	1050	1050	0	1,050	1	1,000	4,288
			Total	**7,233**	**10,895**	**2,458**	**34,278**	**6,726**	**49,229**	**443,137**	**61,207**	**26,349**	**17,254**	**152,948**	**52**	**1,015,766**	**$1,611,851**
																Risk managed amount	**$(66,851)**
																Total OTIP budget	**$1,545,000**

* Nelson region project to estimate long-term timber supply impacts from the use of orchard seed. Prorated to 4 SPU; total $20,000.

3.4 Expansion of Class A Seed Supply (GenSeed Ltd.) Subprogram

Expansion of seed orchards and rooted cutting production is required in some SPUs to meet the FGC objectives of increasing Class A seed use and quality. Forest Renewal BC will support seed orchard expansions and the co-operative production of vegetative materials through GenSeed Ltd., a corporation wholly owned by the B.C. Forest Genetics Society and under the control of stakeholders (Figure 3).

Figure 3 Organizational relationships among GenSeed Ltd., Forest Renewal BC, Forest Genetics Council, and B.C. Forest Genetics Society



GenSeed's primary mandate is to support needed seed orchard expansions and the development of rooted cutting technologies with nurseries and industry to meet FGC objectives. GenSeed also provides program management services to FGC.

3.4.1 Planning

GenSeed's business plan and investments are based on the long-term and annual business plans prepared by FGC TACs. Species plans (Appendix 4) contain analyses of projected orchard expansion needs that guide GenSeed investments. Specific technical advice is sought as required from species committees or others with the needed expertise.

3.4.2 Management

Management discretion for spending lies with the GenSeed Board of Directors,[4] and is limited and directed by the terms of GenSeed-FRBC Agreements (see Section 4.0). Investments in new orchards will generally use a request for proposal process, with emphasis on both the technical quality of developments and cost.

Forest Renewal BC and GenSeed are currently negotiating the terms for a Multi-Year Agreement (MYA) to provide the long-term funding for GenSeed to meet FGC objectives. Specific budget

[4] The Board is comprised of representatives from the private sector and government, including the industry and government FGC Co-Chairs.

details are not listed in this plan, as they could compromise the request-for-proposal process used to contract the orchard expansions.

3.4.3 Activities and Budget

In 2000/01, GenSeed will focus on providing propagation needed for future orchard expansions. Other activities will include the completion of an agreement to expand existing orchards (SPU 21, Fdi NE low, and SPU 41, Fdi PG), and FGC program management. Most of the $4,766,300 Forest Renewal BC TIP budget allocated to GenSeed activities in 2000/01 will go to a fund for long-term agreements.

3.5 Extension and Communication Subprogram

The Extension and Communication Subprogram supports FGC goals and objectives through three types of activities:

- extension (i.e., providing technical information and training to seed users and tree improvement specialists)
- communication (i.e., developing and disseminating information on the program and its activities to all FGC target audiences)
- education (i.e., foster support for the education of tree improvement specialists and technologists, including continuing education)

3.5.1 Planning

Extension and communication activities are developed and guided by the FGC Extension Technical Advisory Committee (ETAC), formed in 2000. ETAC includes representatives from many of the groups involved in research, extension, training, and communications related to forest gene resource management and the use of improved reforestation materials.[5]

ETAC is currently finalizing an extension and communication strategy based on four goals:

1. To foster the support needed to achieve Council goals for the provincial forest gene resource management program.
2. To provide a central directory of information sources relating to tree improvement with opportunities for user feedback and to disseminate information about Forest Genetics Council activity, tree improvement policy, and related technical information.
3. To assist users and specialists in acquiring and developing needed technical information and encourage the sharing of information among researchers, producers, and users of improved reforestation materials.
4. To encourage and assist with the development of curricula, workshops, and educational materials in the field of forest gene resource management.

The strategy outlines key audiences, messages, and delivery mechanisms.

[5] E.g., MoF Tree Improvement Branch, UBC, UNBC, FGC Secretariat, Southern Interior Forest Extension Research Partnership (SIFERP), forest companies, seed producers, and research agencies.

Based on this framework, and with input from stakeholders, ETAC will prepare an annual Activity Plan, including a budget, for Council's approval. Project ideas or proposals from any interested party can be submitted to ETAC through the FGC Executive Secretariat or any ETAC member. ETAC voting members will rank projects for the Activity Plan based on the key audiences, goals, and messages for that fiscal year. Ranking will identify the types of projects that will/will not be eligible for funding.

3.5.2 Management

Extension, communication, and education activities will be implemented in two ways:

- Direct award of projects to qualified parties who have expressed an interest in the FGC Extension and Communication Subprogram (unsolicited expressions of interest or expressions received in response to a formal call for expressions of interest).

  The Chair and a minimum of one other ETAC member or content specialist will review each project workplan before a contract is awarded.

- Projects awarded in response to an annual call for proposals to develop projects that address priority goals, messages, and audiences identified in the annual activity plan.

  In future years, the extension call for proposals will be incorporated as a section in the OTIP annual call for proposals.

Contracts for approved projects will be administered by the MoF Tree Improvement Branch under its current Goals Agreement with Forest Renewal BC.

3.5.3 Activities and Budget

The extension and communication budget for 2000/01 is $170,000. In-kind, staff time and other contributions by affiliated companies and agencies are additional to this amount.

3.6 Seed Planning and Information Tools Subprogram

The Seed Planning and Information Tools Subprogram supports the development of computer-based information systems that improve user access to information on improved reforestation materials for planning and deployment purposes.

3.6.1 Planning

Seed Planning and Information Tools activities and budgets are developed by the Seed Information Systems Steering Committee (SISSC), formerly the SPAR[6] Steering Committee. The SISSC is comprised of staff from the MoF Tree Improvement Branch (TIB), MoF systems staff, and the FGC Program Manager. Projects are identified by the Committee, developed by TIB staff and presented to the Forest Genetics Council for approval. Approved projects are recommended to Forest Renewal BC as part of the annual FGC Business Plan.

[6] SPAR is the Seed Planning and Registration System; a computer-based system used for the cataloguing, ordering and tracking of all seed use on Crown lands.

3.6.2 Management

MoF Tree Improvement Branch administers the Seed Planning and Information Tools Subprogram. Significant project changes or re-allocations of funds from the approved Business Plan require approval of the FGC Program Manager and, when needed, the FGC.

3.6.3 Activities and Budget

Activities in 2000/01 will focus on providing information for planning purposes (summary and projected data), integrating information systems with corporate spatial information, and improving client access to information.

Three projects will receive a total allocation of $275,000: Web-based access to the Seed Planning and Registry System (SPAR), further development of the Species Plan Information Reporting System (SPIR), and development of a Seed Planning Zone Web Map Tool (Table 4).

Table 4 Projects supporting improved seed planning

Project description	2000/01 Budget
SPAR Conversion project	$125,000
Species Plan Information Reporting system (SPIR)	$100,000
Seed Planning Zone Web Map Tool	$50,000
Total	**$275,000**

3.7 Administration Subprogram

The Administration Subprogram has two components:

- the administrative infrastructure provided by the MoF for the Tree Breeding, OTIP, Extension and Communication, and Seed Planning and Information Tools subprograms
- the FGC Executive Secretariat that supports Council's day-to-day business, communication, meetings, correspondence, and planning activities.

3.7.1 Planning

The costs for MoF administration are negotiated between Forest Renewal BC and the MoF.

The budget for the Executive Secretariat is based on FGC support needs as determined by the FGC Co-Chair, the FGC Program Manager and the MoF Tree Improvement Program Administrator.

3.7.2 Management

The Ministry of Forests is responsible for all aspects of organization, review, and financial administration for the Tree Breeding, OTIP, Extension and Communication, and Seed Planning and Information Tools subprograms as set out in the FRBC/Ministry of Forests Goals Agreement. The Executive Secretariat services are contracted out through a competitive bid process. All administrative and Executive Secretariat work is carried out to support FGC programs and plans.

3.7.3 Activities and Budget

The 2000/01 budget for the Administration Subprogram is $365,000.

3.8 Subprogram Budget Summary

Table 5 Budget summary for Forest Renewal BC contributions to subprograms

Subprogram	Budget
Gene Conservation	$183,700
Tree Breeding	$2,350,000
Operational Tree Improvement Program (OTIP)	$1,545,000
Expansion of Class A Seed Supply (GenSeed Ltd.)	$4,766,300
Extension and Communication	$170,000
Seed Planning and Information Tools	$275,000
Administration	$365,000
Total FRBC Tree Improvement Program Contribution*	**$9,655,000**

* Excludes FRBC administration costs

4.0 Funding and Administrative Mechanisms

This section outlines the agreements through which the Forest Renewal BC Tree Improvement Program funds the FGC Business Plan.

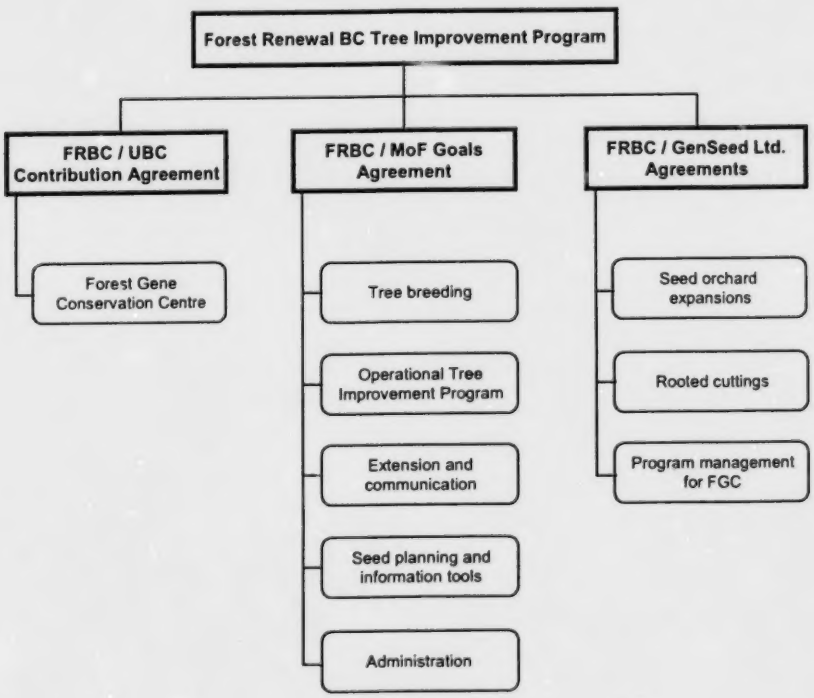
4.1 Funding Agreements

The Forest Renewal BC Tree Improvement Program funds the FGC Business Plan through three administrative mechanisms:

- FRBC/University of BC Contribution Agreement
- FRBC/Ministry of Forests Goals Agreement
- FRBC/GenSeed Ltd. Contribution and Multi-Year Agreements

The subprograms associated with each of the mechanisms are shown in Figure 4.

Figure 4 Administrative mechanisms for the delivery of Forest Renewal BC TIP

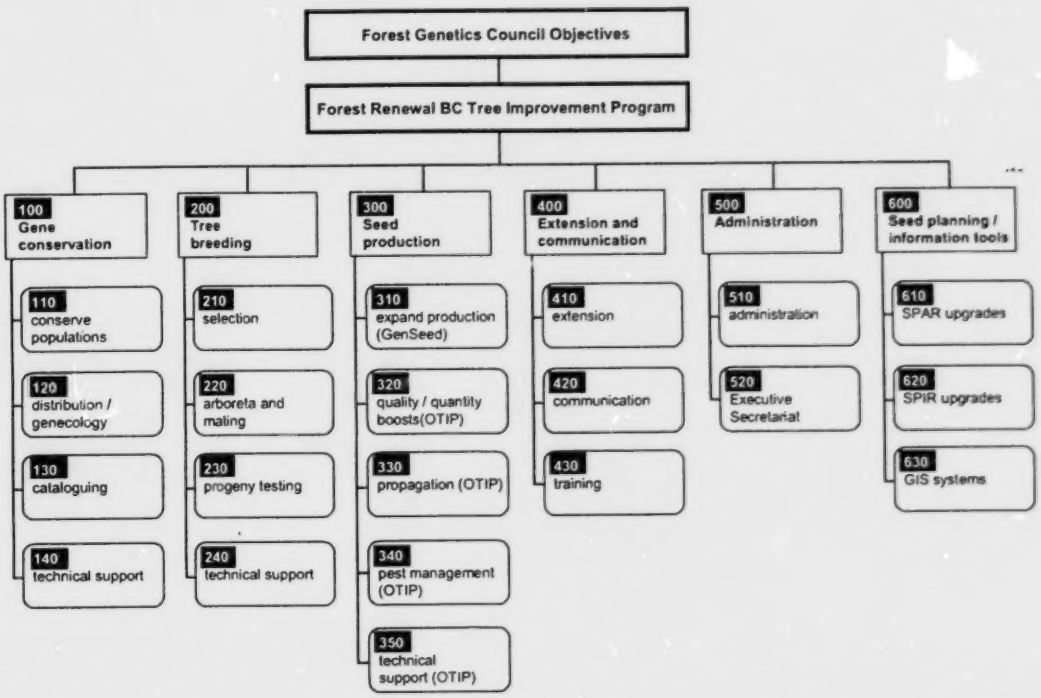


Resources from other agencies include in-kind facilities, staff and direct funds. Seed sales from orchards also provide revenue to support seed production.

4.2 Monitoring and Reporting

Forest Renewal BC requires that activities funded through its TIP be monitored for performance relative to criteria, and for progress towards long-term objectives. Performance monitoring and reporting will be carried out for each subprogram. To facilitate subprogram monitoring, activities are categorized using a work breakdown structure (Figure 5).

Figure 5 Work breakdown structure for program administrative organization, monitoring and management



4.2.1 Reporting for the Gene Conservation, Extension and Communication, and Seed Planning and Information Tools Subprograms

For the Gene Conservation, Extension and Communication, and Seed Planning and Information Tools subprograms, the TAC chair or subprogram leader will submit written reports on activities and spending to the FGC Program Manager on October 15 and March 31, 2000.

4.2.2 Reporting for the Tree Breeding, OTIP, and GenSeed Subprograms

Progress for the Tree Breeding, OTIP, and Expansion of Class A Seed Supply (GenSeed) subprograms will be reported by spending and key performance indicators (KPI). The indicators will simplify reporting for project proponents, and make it possible to summarize progress at the project, seed planning unit, and provincial levels. KPI descriptions by work breakdown category are shown in the activity sheets of the Species Plans (Appendix 4). Progress towards FGC

objectives 3 and 4 (increasing genetic gain, increasing Class A seed use) will be reported using summaries of orchard seed use and genetic worth.

Project-Level Reporting

Project activities will be organized into the categories identified in the work breakdown structure (Figure 5) (e.g., 320 Quality/Quantity Boosts). Individual projects (e.g., 321 grafting for ramet replacement) will report on KPIs (e.g., number of grafts made) and spending for each year of implementation. Tree Breeding and OTIP project reports will be summarized to formats shown in Tables 2 and 3 (see Section 3.0). Reporting for technical support projects, which are more variable in nature, will use indicators designed for each project. Where actual work or spending differs substantially from that planned, variance reports explaining the reasons will be required. Work quality will be periodically audited through Review Committees and site visits.

Seed Planning Unit-Level Reporting

Accomplishments and spending will be summarized by activity type for each SPU. Progress for FGC objectives 3 and 4 (genetic gain and "Class A" seed production) will be summarized using information derived from the MoF Seed Planning and Registry System (SPAR).

Provincial-Level Reporting

At the provincial level, total activities and spending will be summarized using KPI and budgets from project-level reports. In addition, actual progress towards FGC objectives 3 and 4 (gain, production) will be summarized across all SPUs using SPU-level reports.

Table 6 identifies the reporting requirements for Tree Breeding and OTIP subprograms.

Table 6 List of reports, responsibilities, distribution and preparation dates for Forest Renewal BC-supported Tree Breeding and OTIP projects

Type of report	Prepared by	Prepared for	Distribution	Dates due
Interim project status* (breeding and OTIP)	Breeder or OTIP project proponent	MoF program administrators for early FY reallocations	On request	Aug 1
Project level - Breeding	Breeder	MoF Program Administrator	On request	Oct 15 March 31
Project level - OTIP	Project proponent	MoF Program Administrator	On request	Oct. 15 March 31
Progress report for FRBC/MoF Goals Agreement	Director/Program Admin. MoF	FRBC Program Monitor/Program Steering Committee	FRBC Program Monitor; Program Steering Committee members; FGC Co-Chairs	Nov 1 May 1
Species Plan Progress Report	FGC Program Manager, Director MoF	FGC, FRBC Program Monitor	FGC members; FRBC Prog. Monitor; CTAC and ITAC Chairs; Species Committee members	Nov 1 May 1
Provincial progress summary	FGC Program Manager/ Director MoF	FGC/ FRBC Program Monitor, Chief Forester	Provincial Chief Forester; FGC members; TAC members; FRBC Prog. Monitor	May 1

* Note: The Interim Project Status report is an informal report intended only to identify those projects that are not progressing as planned, and for which funds may be re-allocated.

Appendix 1: Summary of Budgets, Planning Processes, and Delivery Mechanisms

Subprogram	Budget	Description	Subprogram development process	Delivery mechanism
Gene Conservation	$183,700	Conservation of the genetic diversity of tree species	FGC Gene Conservation TAC Program plan developed by UBC in consultation with the GCTAC	FRBC/UBC Contribution Agreement
Tree Breeding	$2,350,000	Testing, breeding and selection of high value stock from natural populations Technical support to understand genetic patterns and mechanisms	FGC sets program priorities Strategies developed by MoF tree breeders in conjunction with stakeholder committees Technical committee review Reporting and monitoring of key indicators	FRBC/MoF Goals Agreement MoF delivery to meet FGC plans
Operational Tree Improvement Program (OTIP)	$1,545,000	Support to increase seed orchard seed production and genetic quality Technical support for orchard production and management Orchard pest management	FGC sets program priorities Call for proposals based on priorities Stakeholder review of proposals Funding to successful proponents Reporting and monitoring of key indicators	FRBC/MoF Goals Agreement MoF delivery to meet FGC plans
Expansion of Class A Seed Supply (GenSeed Ltd.)	$4,766,300	Expansion of the production capacity of seed orchards Development of rooted cutting systems in support of FGC objectives FGC program management	FGC sets program priorities Stakeholder committees develop strategy and identify need and technical standards	FRBC/GenSeed Multi-year Agreement GenSeed delivery through contract RFP process
Extension and Communication	$170,000	Extension activities to help client groups access and use Class A seed and vegetative materials Associated information and communication to identified client groups Training related to the use of improved reforestation materials	FGC Extension TAC develops strategy and ranks projects for funding each year Potential projects identified by ETAC, expressions of interest, and ideas submitted by proponents	FRBC/MoF Goals Agreement RFP and direct contracts MoF delivery to meet FGC plans >
Seed Planning and Information Tools	$275,000	Three projects to improve user access to information: (1) Web-based SPAR access (2) Species Plan Information Reporting (SPIR), (3) Seed planning map viewer (web-based)	SPAR subcommittee development of priorities client input delivery through the MoF Tree Improvement Branch and contractors	FRBC/MoF Goals Agreement MoF delivery to meet plans approved by FGC
Administration	$365,000	Administrative overhead costs for financial delivery and reporting through the MoF Tree Improvement Branch FGC Executive Secretary support	Government financial controls and administrative systems are applied	FRBC/MoF Goals Agreement Exec. Sec. delivered through contract
Total	**$9,655,000**			

Appendix 2: Seed Planning Units and Rankings

The following table summarizes the program rankings developed through the Tree Improvement Investment Priority model. The model estimates value and ranks potential tree improvement investments in British Columbia based on the direct economic benefits derived from increased harvest due to tree improvement activities. All SPUs listed have a Species Plan in Appendix 4. Annual planting is the mean of 1995–1999 seedling requests to SPAR. MAI values and rotation ages are derived from the TIPSY growth model using mean site index values developed using site index/site association correlations.

Seed planning unit (SPU)				Annual planting	MAI	Rotation age
#	Species	SPZ	Elev. band (m)	(million)	(TIPSY)	(TIPSY)
1	Fdc	M low	0-700	6.0	11.2	60
2	Cw	M low	0-600	7.2	8.5	80
3	Hw	M low	0-600	3.4	11.0	70
4	Sx	NE low	<1300	6.0	5.0	80
5	Sx	NE high	13-1700	9.5	3.8	90
6	Ss	M	0-750	3.0	13.0	70
7	Pli	NE low	<1400	5.1	5.5	50
8	Pw	Coast	0-1000	2.0	11.1	60
9	Ba	All	0-700	3.0	11.3	80
10	Pli	TO low	<1400	6.3	3.8	70
11	Yc	M	400-1200	1.1	7.4	80
12	Pli	PG low	<1100	13.4	5.0	60
13	Lw	NE	<1300	3.0	4.9	70
14	Sx	PG low	<1200	26.5	3.6	80
15	Pw	S. Int.	<1400	3.0	5.6	70
16	Pli	TO high	>1400	6.5	3.1	80
17	Pli	BV low	<1100	17.6	3.9	60
18	Pli	CP low	<1000	12.3	4.6	60
19	Fdc	SM	200-1000	1.5	5.8	80
20	Pli	NE high	>1400	2.7	3.8	70
21	Fdi	NE low	<1000	1.5	4.7	60
22	Fdi	NE high	>1000	1.7	4.8	60
23	Sx/Ss	SM/NST	all	2.5	5.0	90
24	Hw	M high	600+	1.0	10.2	70
25	Sx	EK low	<1700	1.8	3.7	80
26	Pli	PG high	>1100	6.0	3.8	60
27	Cw	SM	200-1000	1.0	6.2	90
28	Sx	TO high	1300-1850	3.5	2.6	90
29	Pli	EK high	>1400	2.4	3.7	70
30	Sx	TO low	<1300	1.5	3.4	80
31	Fd	M High	700+	0.7	6.3	80
32	Pli	EK low	<1400	2.4	2.8	80

Seed planning unit (SPU)				Annual planting	MAI	Rotation age
#	Species	SPZ	Elev. band (m)	(million)	(TIPSY)	(TIPSY)
33	Cw	M high	600+	0.7	7.4	90
34	Lw	EK	800-1500	0.8	3.5	70
35	Sx	BV low	<1200	5.8	4.2	80
36	Bg	M low	0-700	0.3	9.0	70
37	Fd	QL	all elev.	1.3	4.4	60
38	Hw	M low north	<600	Included with SPU 3 (Hw M low)		
39	Fdi	EK	all elev.	0.6	3.0	80
40	Sx	PR low	<1200	15.0	3.0	80
41	Fdi	PG	all elev.	1.5	3.5	80
42	Sx	PG high	>1200	2.5	3.2	90
43	Fdi	CT	all elev.	0.6	3.1	70

Appendix 3: Forest Genetics Council and Technical Advisory Committee Members

Forest Genetics Council of BC

Name	Affiliation	Representing
Shane Browne-Clayton	Riverside Forest Products	Industry Co-Chair
Dr. Dale Draper	Ministry of Forests	Ministry of Forests Co-Chair
Dr. Sally Aitken	University of BC	Coastal Technical Advisory Committee
Dr. John Barker	University of BC	Coast industry
Henry Benskin	Ministry of Forests	Forestry Division, Research Branch
Dr. Michael Carlson	Ministry of Forests	Interior Technical Advisory Committee
Janet Gagne	Forest Renewal BC	Forest Renewal BC
Dr. Chris Hawkins	University of Northern BC	University
Mark Hopkins	Ainsworth Forest Products	Interior industry
Art Lacourciere	Weldwood Canada	Interior industry
Diane Medves	Weyerhaeuser Canada	Coast industry
John Pollack	Ministry of Forests, Nelson	Operations Division
Ray Schultz	Ministry of Forests, Prince George	Operations Division

Gene Conservation Technical Advisory Committee

Name	Affiliation
Diane Medves (Chair)	Weyerhaeuser
Dr. Sally Aitken	UBC
Dr. Dale Draper	Ministry of Forests
Jack Woods	GenSeed Ltd.
Dr. Alvin Yanchuk	Ministry of Forests
Dr. Cheng Ying	Ministry of Forests

Coastal Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Sally Aitken (Chair)	University of BC	David Reid	Ministry of Forests
Patti Brown	Canadian Forest Products	Dr. John Russell	Ministry of Forests
Tim Crowder	TimberWest Forests	Larry Sigurdson	Ministry of Forests
Dr. David Cyr	Cellfor Ltd.	Dr. Michael Stoehr	Ministry of Forests
Dr. John King	Ministry of Forests	Annette Van Niejenhuis	Western Forest Products
David Kolotelo	Ministry of Forests	Dr. Joe Webber	Ministry of Forests
Diane Medves	Weyerhaeuser Canada	Dr. Alvin Yanchuk	Ministry of Forests
Gerry Pinkerton	Ministry of Forests		

Interior Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Michael Carlson (Chair)	Ministry of Forests	Tim Lee	Vernon Seed Orchard Co.
David Basaraba	Crestbrook Forest Industries	Mike Madill	Ministry of Forests
Shane Browne-Clayton	Riverside Forest Products	Anna Monetta	Ministry of Forests
Keith Cox	Ministry of Forests	George Nicholson	Riverside Forest Products
Nola Daintith	Ministry of Forests	Gerry Pinkerton	Ministry of Forests
Mark Faliszewski	Ministry of Forests	Steve Thorpe	Canadian Forest Products
Hillary Graham	Pacific Regeneration Technologies	Eric Van Steenis	Ministry of Forests
Terry Hammond	Pope & Talbot	Chris Walsh	Ministry of Forests
Dr. Chris Hawkins	University of Northern BC	Kim Young	Tolko Industries
Barry Jaquish	Ministry of Forests		

Extension Technical Advisory Committee

Voting Member	Affiliation	Alternates	Affiliation
Dr. Chris Hawkins	UNBC (Chair)	Diane Gertzen	Ministry of Forests
Keith Cox	Ministry of Forests	Jordan Tanz	FGC Secretariat
Tim Crowder	TimberWest	Steve Thorpe	Canfor
Peter Forsythe	The Pas Lumber	Eric Van Steenis	Ministry of Forests
Lauchlan Glen	Glenviron Consulting		
Melissa Hadley	FGC Secretariat	**Interested Parties**	**Affiliation**
Tim Lee	Vernon Seed Orchard Company	Roger Painter	Ministry of Forests
George Nicholson	Riverside Forest Products	David Reid	Ministry of Forests
Don Pigott	Yellow Point Propagation	Jack Woods	GenSeed Ltd.
John Pollack	Ministry of Forests		
Doug Stables	Western Forest Products		
Don Summers	Ministry of Forests		
Kathie Swift	SIFERP		
Dr. Joe Webber	Ministry of Forests		

Appendix 4: Species Plans

Species plans are organized by species. Each plan contains four pages as follows:

- **Timelines:** with breeding, orchard production and orchard gain estimates.
- **Activities:** Planned activities, as measured by key performance indicators, for most work-breakdown-structure (WBS) categories (Figure 5). Breeding programs and seed production programs are included. Activities were developed through the species planning process, and through management process described earlier in this plan.
- **Budgets:** Planned spending by WBS category for all activities. These budgets were derived through processes described in Section 3.0.
- **Orchards:** Existing orchards are listed, with number of ramets, expected annual seed production, total seed need, expansion requirements, and assumptions made for ramet production and seedling recovery.

9	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 09Baall19July2000

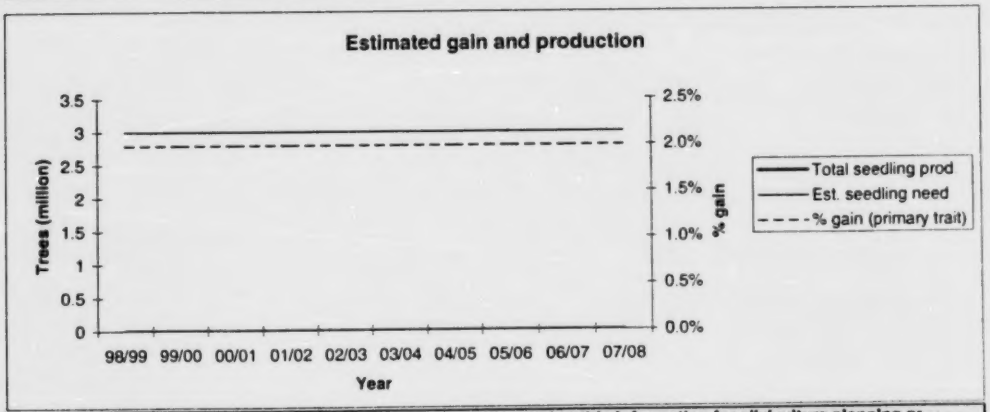
***Abies amabilis* - Pacific Silver Fir (all)**

Ba all **0-700 m**

Seedling need (million):	3.0
Program total value rank:	9

Traits for improvement:	
Primary:	Volume
Secondary:	Balsam wooly aphid resistance

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin.	No breeding program									
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
129 TW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
129 TW	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total gain	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File:09Baall19July2000

ORCHARDS

***Abies amabilis* - Pacific Silver Fir (all)**

9 Ba all **0-700 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Mt Newton	129	106	2%	2,567	2,567	???	???	???	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
		Total ramets		2,567	2,567	F15	**Total production**	0.000	I15

Vegetative propagation

Stecklings/Emblings 0.0 I17

Total production 0.0 I19

managed on an experimental basis
until 2004/05 when a critical decision will be made.

Annual planting	3,000	I21
Deficit	-3,000	I22
Ramets required	3,000	I23
Ramets required with over-capacity	3,900	I24
Projected necessary expansion	1,333	

I19-I21
I21*1,000,000/F27
I23*1.2
I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,000 F27

Planned over-production capacity = 1.3

Seed weight seeds/g

Seedling recovery factor seedlings/seed

Conclusions: This species probably not amenable to conventional orchard management.

File 09Basil19July2000

ACTIVITIES

***Abies amabilis* - Pacific Silver Fir (all)**

9 Ba all 0-700 m Prog. Tot Value Rank 9/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 3.000	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets (1000)
2 Mating										Breeding strategy crosses made on time	Number of crosses
230 1) provenance testing											
1 Seed collection	40									Appropriate seed collection for trial	# sources, # families, #g seed/family
2 Design		4								Strategic and efficient sampling & test design	Year design finalized
3 Establish		2	2							Provenance trials establ. to design specifications	Number of test sites
4 Maintain			4	4	4	4	4	4	4	Provenance trial trees free-growing	Number of test sites maintained
5 Measure						4				Sites measured as in strategy	Number of test sites measured
6 Analyze						1				Interim seed transfer rules & B+ seed sources	Number of test series analyzed
240 2) Prov./Progeny test											
1 Design										One provenance/progeny test series designed	Year design finalized
2 Establish										Provenance trials establ. to design specifications	Number of test sites
3 Maintain										Provenance trial trees free-growing	Number of test sites maintained
4 Measure										Sites measured as in strategy	Number of test sites measured
5 Analyze										Definitive seed transfer rules & B+ seed sources	Number of test series analyzed
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Rogung										Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP		300								Genetic gain for primary trait	(50% of mature ramets)
5 Induction		300								Orchard production	Number of ramets induced
6 Orchard management/holding beds		2,230	X	X	X	X				Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control		2,230	X	X	X	X				Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X				Full orchard production	Number of ramets treated
3 Monitoring			X	X	X	X				Full orchard production	Surveys conducted
350 Technical Support											
1 Orlet age study in potted orchard			1							Decision on potted orchards for Abies spp.	Study reports
2 Vegetative growth and cone production			1							Decision s. orchards vs B+ seed production areas	Study reports
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File:09Baall19July2000

BUDGETS

***Abies amabilis* - Pacific Silver Fir (all)**

9 Ba all 0-700 m											
Prog. Tot Value Rank 9/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Females selected for breeding arboreta										0.0	
											0.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (remote)										0.0	
2 Mating										0.0	
											0.0
230 1) provenance testing											
1 Design	0.0									0.0	
2 Establish		43.8	35.0							78.8	
3 Maintain		35.0	20.0	30.0	20.0	20.0	20.0	20.0	15.0	180.0	
4 Measure						25.0				25.0	
5 Analyze										0.0	
											283.6
240 2) Prov./Progeny test											
1 Design										0.0	
2 Establish										0.0	
3 Maintain										0.0	
4 Measure										0.0	
5 Analyze										0.0	
6										0.0	*0.0*
	0.0	78.8	55.0	30.0	20.0	45.0	20.0	20.0	15.0	*Sub-TOT*	*283.6*
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management										0.0	
											0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										0.0	
2 Ramet replacement										0.0	
3 Roguing										0.0	
4 SMP / CP		4.9								4.9	
5 Induction		4.9								4.9	
6 Orchard management/holding beds		4.9	X	X	X	X				4.9	
											14.7
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control		4.9	X	X	X	X				4.9	
2 Disease control			X	X	X	X				0.0	
3 Monitoring			X	X	X	X				0.0	
											4.9
350 Technical Support											
1 Orlet age study in potted orchard			X							0.0	
2 Vegetative growth and cone production			X							0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	
	Past Yr	Current Yr	Next Yr								*0.0*
SUB TOT	0.0	19.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*19.6*	
GRAND TOTALS	0.0	98.2	55.0	30.0	20.0	45.0	20.0	20.0	15.0	303.2	303.2

36 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 36BgMlow19July2000

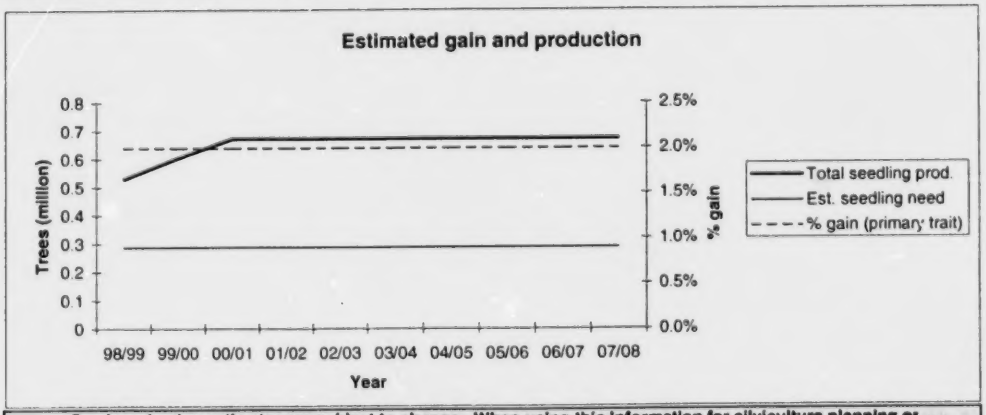
Abies grandis - Grand Fir (M, low)

Bg M low **0-700 m**

Seedling need (million):	0.3
Program total value rank:	36

Traits for improvement:	
Primary	Stem volume
Secondary	Adelgid resistance

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	No breeding program									
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
167 Haslam Ck (YPP)	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
167 Haslam Ck (YPP)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total gain	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 36BgMlow19July2000

ORCHARDS

***Abies grandis* - Grand Fir (M, low)**

36 Bg M low **0-700 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Haslam Ck	167*	56	2%	672	672	70.0	1,080	0.7	I8
Yellow Pt Propagation									
	* Licence pending								
									I15
		Total ramets		672	672	F16	**Total production**	0.726	I16

SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	0.0	I18
	Total production	0.7	I20

I16+I18+I20

Annual planting	0.287	I22	
Surplus	0.439	I23	I20-I22
Ramets required	287	I24	I22*1,000,000/F28
Ramets required with over-capacity	373	I25	I24*F29
Projected necessary expansion	0		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,000		F28
Planned over-production capacity = 1.3		F29
Seed weight	10.38	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Haslam Ck orchard could meet all the needs for Bg when it is in full production.

File: 36BgMlow19July2000

ACTIVITIES

Abies grandis - Grand Fir (M, low)

36 Bg M low 0-700 m										Annual planting million		
Prog. Tot Value Rank 36/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	0.287		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**	
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made	
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets (1000)	
2 Mating										Breeding strategy crosses made on time	Number of crosses	
230 Progeny testing												
1 Design										Strategic and efficient mating and test design	Year design finalized	
2 Establish										Progeny tests establ. to design specifications	Number of test sites	
3 Maintain										Progeny test trees free-growing	Number of test sites maintained	
4 Measure										Sites measured as in strategy	Number of test sites measured	
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed	
240 Technical Support												
1 Provenance trial	M	1								Appropriate seed transfer guidelines	Reports	
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made	
2 New orchards										Full production capacity	Number of ramets established	
3 Orchard expansions										Full production capacity	Number of ramets established	
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained	
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made	
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced	
3 Rogueing										Genetic gain for primary trait	Number of ramets rogued	
4 SMP / CP										Genetic gain for primary trait	Number of ramets treated	
5 Induction										Orchard production	Number of ramets induced	
6 Orchard management/holding beds										Productive orchard	Number of ramets maintained	
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced	
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced	
3 Other										High genetic worth materials bulked up	Numbers of propagules produced	
340 Pest Management												
1 Conservation & mgmt B+ stands										Full orchard production	Number of ramets treated	
2 Disease control										Full orchard production	Number of ramets treated	
3 Monitoring										Full orchard production	Surveys conducted	
350 Technical Support												
1 Potential for B+ collection in parks				X						Protocols established MoF & MoE	Study report	
2 Conservation & mgmt B+ stands										Superior provenance seed available	Stands managed	
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File 36BgMlow19July2000

BUDGETS

Abies grandis - Grand Fir (M, low)

36 Bg M low 0-700 m	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Prog. Tot Value Rank 36/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
› Families selected for breeding arboreta										0.0
										0.0
220 Breed Arboreta & Mating										
› Breeding arboreta (remeas)										0.0
2 Mating										0.0
										0.0
230 Progeny testing										
› Design										0.0
2 Establish										0.0
3 Maintain										0.0
4 Measure										0.0
5 Analyze										0.0
										0.0
240 Technical Support										
› Provenance trial	20.0	9.3								29.3
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0
SUB TOT	20.0	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*Sub-TOT* *29.3*
300 SEED PRODUCTION										
310 Expanded Production										
› Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
› Grafting for ramet replacement										0.0
2 Ramet replacement										0.0
3 Rogging										0.0
4 SMP / CP										0.0
5 Induction										0.0
6 Orchard management/holding beds										0.0
										0.0
330 Vegetative Propagation										
› Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
› Containment & mgmt Bn stands										0.0
2 Disease control										0.0
3 Monitoring										0.0
										0.0
350 Technical Support										
› Potential for Bn collection in parks				X						0.0
2 Containment & mgmt Bn stands										0.0
3										0.0
4										
5										
6										
	Past Yr	Current Yr	Next Yr							*0.0*
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	20.0	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.3 29.3

2 GENETIC IMPROVEMENT STRATEGY TIMELINE

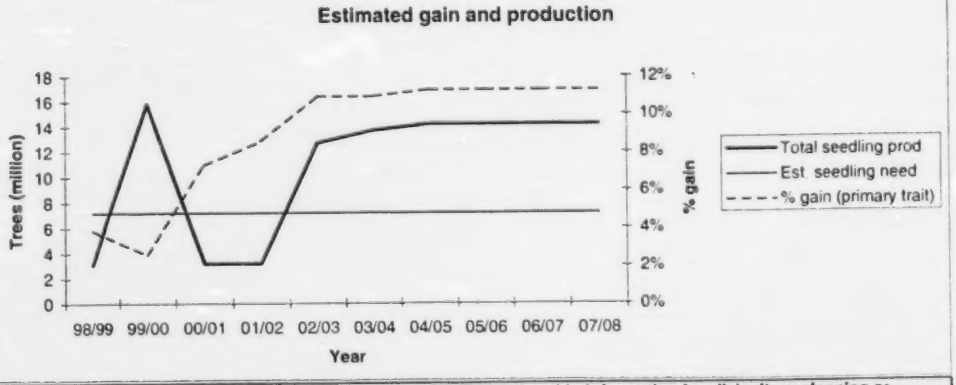
File: 2CwMlow 28JULY2000

***Thuja plicata* - Western Redcedar (M, low)**

Species:	Cw	**Seedling need (million):**	7.2
Zone:	M	**Program total value rank:**	2
Elev. band:	low		

Traits for improvement:	
Primary:	Stem volume
Secondary:	Stem form, wood quality

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin.										
Polycross	300	450	650	750	750	750	750	750	750	???
Clonal										
F1							40	80	120	???
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
128 WFP	0.1	4.9	Retired?	will not retire until site sold						
139 CanFor (potted)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
140 TW	1.5	1.0	1.0	1.0	1.5	2.0	2.0	2.0	2.0	2.0
152 TW	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
155 WFP	0.3	8.2	Retired?	will not retire until site sold						
171 WFP	0.0	0.0	Retired?							
??? NewWFP	Estab				9.0	9.0	9.0	9.0	9.0	9.0
Vegetative prod.:										
Phase 1		0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Phase 2						0.5	1.0	1.0	1.0	1.0
Estimated gain in primary trait										
Orchards (#, owner)										
128 WFP	2%	2%								
139 CanFor (potted)	2%	2%	2%	7%	7%	7%	7%	7%	7%	7%
140 TW	5%	5%	7%	7%	7%	7%	7%	7%	7%	7%
152 TW	5%	5%	7%	7%	7%	7%	7%	7%	7%	7%
155 WFP	2%	2%								
171 WFP	2%	2%								
??? NewWFP					12%	12%	12%	12%	12%	12%
Vegetative prod.:										
Phase 1		12%	12%	12%	12%	12%	15%	15%	15%	15%
Phase 2						15%	15%	15%	15%	15%
Total Production	3.1	15.8	3.2	3.2	12.7	13.7	14.2	14.2	14.2	14.2
Total gain	4%	3%	7%	9%	11%	11%	11%	11%	11%	11%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 2CwMlow 20JULY2000

ORCHARDS

***Thuja plicata* - Western Redcedar (M, low)**

2 Cw M low **0-600 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Lost Lake	128	91	Retired						
Lost Lake	155	57	Retired						
Mt Newton	152	93		40	40	1.6	10,000	0.4	
Mt Newton	140	100		200	200	7.8	10,000	2.0	
Sechelt	139	100		400	400	15.6	10,000	4.0	
Saanich FC	171	65	Retired?						
New Saanich	???*	91		600	600	23.4	10,000	6.0	
		Total ramets		**1,240**	**1,240**	F15	**Total production**	**12.400**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I17
	Total production	**12.4**	I19

*Orchard ??? May only have 600 ramets (some only for pollen production)

Annual planting	**7.162**	I21	
Surplus	**5.238**	I22	I19-I21
Ramets required	**716**	I23	I21*1,000,000/F27
Ramets required with over-capacity	**931**	I24	I23*1.2
Projected necessary expansion	**0**		I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 10,000		F27
Planned over-production capacity = 1.3		
Seed weight	778	seeds/g
Seedling recovery factor	0.33	seedlings/seed

Conclusions: Currently planned expansions are expected to meet long-term demand

File: 2CwMlow 20JULY2000

ACTIVITIES

Thuja plicata - Western Redcedar (M, low)

2 Cw M low 0-600 m										Annual planting million		
Prog. Tot Value Rank 2/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	6.000		
200 BREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS	KPI DESCRIPTION	
210 Selection												
› Families selected for breeding arboreta										Advanced generation selections made	Number of selections made	
220 Breed Arboreta & Mating												
› Breeding arboreta (ramets)										Breeding populations established	Number of ramets	
› Mating	150	150	100	150	100	40	40	40	40	Breeding strategy crosses made on time	Number of crosses	
230 Progeny testing												
› Design										Strategic and efficient mating and test design	Year design finalized	
› Establish	4	4	4	4	4	4	4	4	4	Progeny tests establ. to design specifications	Number of test sites	
› Maintain	8	12	16	20	24	28	32	36	40	Progeny test trees free-growing	Number of test sites maintained	
› Measure			4	4	8	8	8	12	12	Sites measured as in strategy	Number of test sites measured	
› Analyze			1	1	2	2	2	3	3	Test data analysis does not delay selections	Number of test series analyzed	
240 Technical Support												
› Inbreeding study (sel. /meth. /mass)	5.0	4	7	7	7	7	10	10	10	Adv. gen. breeding strategy	Report	
› Selfing study (MBC-DNA markers)	1.0	1	1							Measures of selfing	Report	
› Wood durability (Forintek)	1.0	150	1	1						Genetic markers for selection re durability	Report 150 BVs	
› Genealogy	1.0	1	1	1	1					Seed transfer guidelines	Transfer guidelines	
›												
›												
300 SEED PRODUCTION												
310 Expanded Production												
› Grafting for new or expanded orchards										Full production capacity	Number of grafts made	
› New orchards										Full production capacity	Number of ramets established	
› Orchard expansions										Full production capacity	Number of ramets established	
› Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained	
320 Quality/Quantity Boosts												
› Grafting for ramet replacement										Quantity or quality boosted	Number of ramets grafted	
› Ramet replacement		35								Genetic gain for primary trait	Number of ramets replaced	
› Roguing										Genetic gain for primary trait	Number of ramets rogued	
› SMP / CP		1,359								Genetic gain for primary trait	Number of ramets treated	
› Induction		1,031								Orchard production	Number of ramets induced	
› Orchard management/rotating barbs		6,391								Productive orchard	Number of ramets maintained	
330 Vegetative Propagation												
› Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced	
› SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced	
› Other										High genetic worth materials bulked up	Numbers of propagules produced	
340 Pest Management												
› Insect control		559								Full orchard production	Number of ramets treated	
› Disease control										Full orchard production	Number of ramets treated	
› Monitoring										Full orchard production	Number of ramets monitored	
350 Technical Support												
› Vegetative propagation tech transfer		1								Effective adoption of veg prop by growers	Report	
› Pollen management		1								Effective pollen management	Report	
› Cone induction (hormone etc.)		1								Effective cone induction treatments	Report	
› Selfing in orch. and natural populations		1								Measures of selfing	Report	
› SPZs, seed transfer and Keltha		1								New SPZ maps & seed transfer guidelines	Report	
›												
	Past Yr	Current Yr	Next Yr									

File: 2CwMlow 20JULY2000

BUDGETS

Thuja plicata - Western Redcedar (M, low)

2 Cw M low 0-600 m 0 Prog. Tot Value Rank 2/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	**FRBC BUDGETS '000$**									**TOTALS**
210 Selection										0.0
1 Families selected for breeding arboreta										*0.0*
220 Breed. Arboreta & Mating										0.0
1 Breeding arboreta (remote)										
2 Mating	15.0	18.1	15.0	15.0	15.0	15.0	15.0	15.0	15.0	138.1
										138.1
230 Progeny testing										0.0
1 Design										
2 Establish	120.0	170.0	140.0	120.0	120.0	100.0	100.0	100.0	100.0	1,070.0
3 Maintain	35.0	42.0	45.0	45.0	45.0	30.0	30.0	30.0	30.0	332.0
4 Measure			20.0	20.0	40.0	40.0	40.0	60.0	60.0	280.0
5 Analyze			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
										1,682.0
240 Technical Support										
1 Realized-gain trials (series 2)	10.0	13.0	10.0	10.0	20.0	10.0	10.0	10.0	10.0	103.0
2 Realized-gain trials (series 1)	50.0	28.0	50.0							128.0
3 Provenance testing	50.0	88.0	80.0	50.0						268.0
4	5.0	23.0	15.0	15.0	15.0					73.0
5										0.0
6										0.0
										572.0
	285.0	382.1	375.0	275.0	255.0	195.0	195.0	215.0	215.0	*Sub-TOT* *2,392.1*
300 SEED PRODUCTION										
310 Expanded Production										0.0
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										*0.0*
320 Quality/Quantity Boosts										0.0
1 Grafting for ramet replacement		0.0								2.0
2 Ramet replacement		2.0								0.0
3 Rogung		0.0								10.4
4 SMP / CP		10.4								13.0
5 Induction		13.0								13.0
6 Orchard management/holding beds		13.0								0.0
										38.3
330 Vegetative Propagation										0.0
1 Rooted cuttings		0.0								0.0
2 SE		0.0								0.0
3 Other		0.0								
										0.0
340 Pest Management										8.4
1 Insect control		8.4								0.0
2 Disease control		0.0								0.0
3 Monitoring		0.0								
										8.4
350 Technical Support										40.3
1 Vegetative propagation tech transfer		15.3	25.0							8.6
2 Pollen management		8.6								13.2
3 Cone induction (hormone etc.)		13.2	X			X				49.4
4 Selling in orch. and natural populations		49.4								15.2
5 SPZs, seed transfer and Keithis		15.2								
6										*126.7*
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	148.4	25.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	285.0	530.4	400.0	275.0	255.0	195.0	195.0	215.0	215.0	2,565.4 2,565.4

27 GENETIC IMPROVEMENT STRATEGY TIMELINE

File 27CwSM19JULY2000

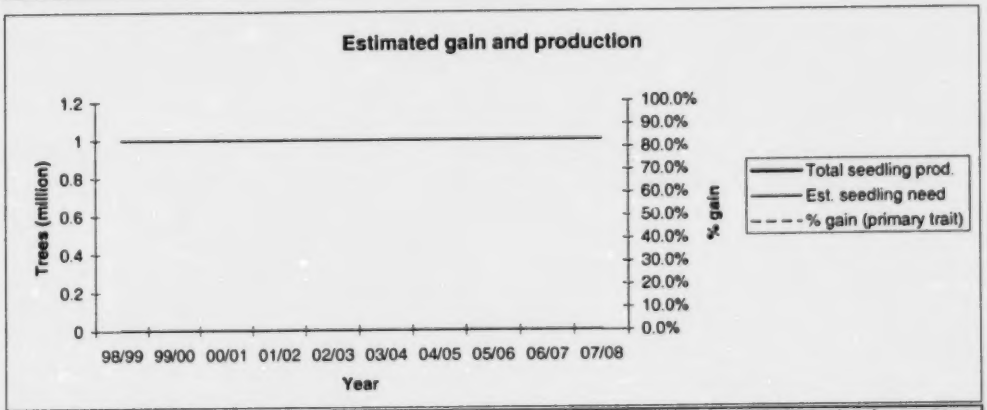
Thuja plicata - Western Redcedar (SM)

Cw SM **200-1000 m**

Seedling need (million):	1.0
Program total value rank:	27

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin										
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)	Orchard need will be evaluated in approximately 2004, when genecology study results are available.									
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total gain										



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File:27CwSM19JULY2000

ORCHARDS

Thuja plicata - Western Redcedar (SM)

27 Cw SM **200-1000 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
None									I8
									I15
		Total ramets		**0**	**0**	F16	**Total production**	**0.000**	I16

SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings	**0.0**	I18	
Total production	**0.0**	I20	I16+I18+I20
Annual planting	**1,000**	I22	
Deficit	**-1,000**	I23	I20-I22
Ramets required	**100**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**130**	I25	I24*F29
Projected necessary expansion	**130**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 10,000		F28
Planned over-production capacity = 1.3		F29
Seed weight	778	seeds/g
Seedling recovery factor	0.33	seedlings/seed

Conclusions: No orchards for Cw SM reconsider in 2004 when genecology study results are available.

File:27CwSM19JULY2000

ACTIVITIES

Thuja plicata - Western Redcedar (SM)

27 Cw SM 200-1000 m										Annual planting million		
Prog. Tot Value Rank 27/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	1.000		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made		Number of selections made
220 Breed. Arboreta & Mating												
1 Breeding arboreta (ramets)										Breeding populations established		Number of ramets
2 Mating										Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design										Strategic and efficient mating and test design		Year design finalized
2 Establish	2	2								Progeny tests establ. to design specifications		Number of test sites
3 Maintain		2	4	4	4	4	4	4	4	Progeny test trees free-growing		Number of test sites maintained
4 Measure				2	2	2	2		2	Sites measured as in strategy		Number of test sites measured
5 Analyze				1	1	1	1		1	Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1												
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement		Number of grafts made
2 Ramet replacement										Genetic gain for primary trait		Number of ramets replaced
3 Rogueing										Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP										Genetic gain for primary trait		Number of ramets treated
5 Induction		100								Orchard production		Number of ramets induced
6 Orchard management/holding beds										Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control										Full orchard production		Number of ramets treated
2 Disease control										Full orchard production		Number of ramets treated
3 Monitoring										Full orchard production		Number of ramets surveyed
350 Technical Support												
1												
2												
3												
4												
5												
6												
	Past Yr	Current Yr	Next Yr									

Orchard need will be evaluated in approximately 2004, when genecology study results are available.

File:27CwSM19JULY2000

BUDGETS

Thuja plicata - Western Redcedar (SM)

27 Cw SM 200-1000 m											
Prog. Tot Value Rank 27/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta										0.0	
											0.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (remets)										0.0	
2 Mating										0.0	
											0.0
230 Progeny testing											
1 Design										0.0	
2 Establish	15.0	12.5								27.5	
3 Maintain		4.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	49.0	
4 Measure				5.0	5.0	5.0	5.0		5.0	25.0	
5 Analyze				0.0	0.0	0.0	0.0		0.0	0.0	
											101.5
240 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	*0.0*
SUB TOT	15.0	16.5	10.0	15.0	10.0	10.0	10.0	5.0	10.0	*Sub-TOT*	*101.5*
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management										0.0	
											0.0
320 Quality/Quantity Boosts											
1 Grafting for remet replacement										0.0	
2 Remet replacement										0.0	
3 Roguing										0.0	
4 SMP / CP										0.0	
5 Induction		19.1								19.1	
6 Orchard management/holding beds										0.0	
											19.1
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control										0.0	
2 Disease control										0.0	
3 Monitoring										0.0	
											0.0
350 Technical Support											
1											
2											
3											
4											
5											
6											*0.0*
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	19.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	**15.0**	**35.6**	**10.0**	**15.0**	**10.0**	**10.0**	**10.0**	**5.0**	**10.0**	**120.6**	**120.6**

Evaluate the need for an orchard in approximately 2004, when genecology study results are available.

33 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 33CwMhigh19JULY2000.xls

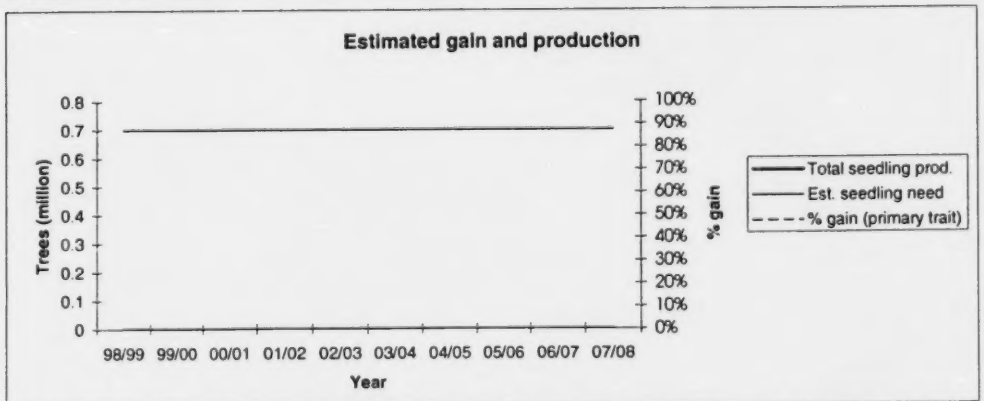
Thuja plicata - Western Redcedar (M, high)

Cw M high **600+ m**

Seedling need (million):	0.7
Program total value rank:	33

Traits for improvement:	
Primary:	
Secondary:	

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	No breeding program									
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total gain										



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 33CwMhigh19JULY2000.xls

ORCHARDS

***Thuja plicata* - Western Redcedar (M, high)**

33 Cw M high **600+ m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
									I8
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	I15
		Total ramets		0	0	F16	**Total production**	0.000	I16

SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings 0.0 I18

Total production 0.0 I20

I16+I18+I20

Annual planting	0.700	I22
Deficit	-0.700	I23
Ramets required	70	I24
Ramets required with over-capacity	91	I25
Projected necessary expansion	91	

I20-I22

I22*1,000,000/F28

I24*F29

I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 10,000		F28
Planned over-production capacity = 1.3		F29
Seed weight	778	seeds/g
Seedling recovery factor	0.33	seedlings/seed

Conclusions: No orchard for Cw M high at this time. Reconsider in 2004 when genecology study results available

File: 33CwMhigh19JULY2000.xls

ACTIVITIES

Thuja plicata - Western Redcedar (M, high)

33 Cw M high 600+ m										Annual planting million		
Proc. Tot Value Rank 33/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	0.700		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**	
210 Selection 1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made	
220 Breed Arboreta & Mating 1 Breeding arboreta (ramets) 2 Mating										Breeding populations established Breeding strategy crosses made on time	Number of ramets Number of crosses	
230 Progeny testing 1 Design 2 Establish 3 Maintain 4 Measure 5 Analyze	1	1 2	1 3 1 1	4	4 3 2	4 1 1	4 2 1	4 2 2	4	Strategic and efficient mating and test design Progeny tests establ to design specifications Progeny test trees free-growing Sites measured as in strategy Test data analysis does not delay selections	Year design finalized Number of test sites Number of test sites maintained Number of test sites measured Number of test series analyzed	
240 Technical Support 1 Elevational transect study 2 3 4 5 6										Transfer limits of low to high determined	Transfer guidelines (2004)	
300 SEED PRODUCTION												
310 Expanded Production 1 Grafting for new or expanded orchards 2 New orchards 3 Orchard expansions 4 Orchard management										Full production capacity Full production capacity Full production capacity Productive orchard (higher GW seedlots)	Number of grafts made Number of ramets established Number of ramets established Number of ramets maintained	
320 Quality/Quantity Boosts 1 Grafting for ramet replacement 2 Ramet replacement 3 Rogueing 4 SMP / CP 5 Induction 6 Orchard management/holding beds	Evaluate need f.or orchards in about 2004 when genecology study results available									Ramets available for replacement Genetic gain for primary trait Genetic gain for primary trait Genetic gain for primary trait Orchard production Productive orchard	Number of grafts made Number of ramets replaced Number of ramets rogued Number of ramets treated Number of ramets induced Number of ramets maintained	
330 Vegetative Propagation 1 Rooted cuttings 2 SE 3 Other										High genetic worth materials bulked up High genetic worth materials bulked up High genetic worth materials bulked up	Millions of rooted cuttings produced Thousands of somatic seedlings produced Numbers of propagules produced	
340 Pest Management 1 Insect control 2 Disease control 3 Monitoring										Full orchard production Full orchard production Full orchard production	Number of ramets treated Number of ramets treated Surveys conducted	
350 Technical Support 1 2 3 4 5 6	Past Yr	Current Yr	Next Yr									

File: 33CwMhigh19JULY2000.xls

BUDGETS

Thuja plicata - Western Redcedar (M, high)

33 Cw M high 600+ m											
Prog. Tot Value Rank 33/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
› Families selected for breeding orchards										0.0	
											0.0
220 Breed Arboreta & Mating											
› Breeding arboreta (remeas)										0.0	
› Mating										0.0	
											0.0
230 Progeny testing											
› Design										0.0	
› Establish		8.2	5.0							13.2	
› Maintain	5.0	4.2	10.0	10.0	10.0	5.0	5.0	5.0	5.0	59.2	
› Measure			2.5		7.5	2.5	5.0	5.0		22.5	
› Analyze			0.0		0.0	0.0	0.0	0.0		0.0	
											94.9
240 Technical Support											
› Elevational transect study										0.0	
›										0.0	
›										0.0	
›										0.0	
›										0.0	
›										0.0	0.0
SUB TOT	5.0	12.4	17.5	10.0	17.5	7.5	10.0	10.0	5.0	*Sub-TOT*	94.9
300 SEED PRODUCTION											
310 Expanded Production											
› Grafting for new or expanded orchards										0.0	
› New orchards										0.0	
› Orchard expansions										0.0	
› Orchard management										0.0	
											0.0
320 Quality/Quantity Boosts											
› Grafting for ramet replacement										0.0	
› Ramet replacement										0.0	
› Flagging										0.0	
› SMP / CP										0.0	
› Induction										0.0	
› Orchard management/building tools										0.0	
			Evaluate need for orchards in about 2004 when genecology study results available								0.0
330 Vegetative Propagation											
› Rooted cuttings										0.0	
› SE										0.0	
› Other										0.0	
											0.0
340 Pest Management											
› Insect control										0.0	
› Disease control										0.0	
› Monitoring										0.0	
											0.0
350 Technical Support											
›										0.0	
›										0.0	
›										0.0	
›											
›											
›	Past Yr	Current Yr	Next Yr								0.0
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	5.0	12.4	17.5	10.0	17.5	7.5	10.0	10.0	5.0	94.9	94.9

11 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 11YcM24JULY2000

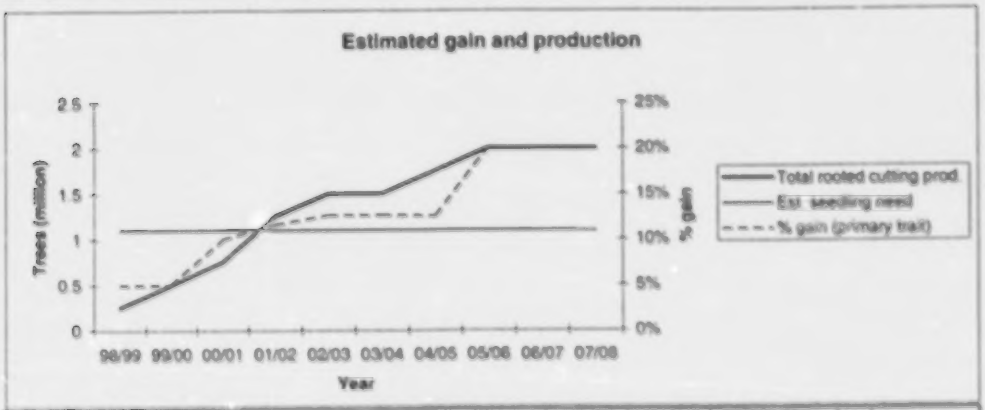
Chamaecyparis nootkatensis - Yellow Cedar (M)

Yc M 400-1200 m

Seedling need (million): 1.1
Program total value rank: 11

Traits for improvement:	
Primary	Stem volume
Secondary	Wood quality, Stem form

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polln	170									
Polycross										
Clonal	6,000	8,000								
F1	200	300								
F2								60	90	120
F3										
Production capabilities (million plantables)				All rooted cuttings						
Hedges (owner)										
MoF tested clones			0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5
WFP tested clones				0.3	0.5	0.5	0.5	0.5	0.5	0.5
MoF FS/VP							0.3	0.5	0.5	0.5
TW (MB) OP FS/VP	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Hedges (owner)										
MoF tested clones			10%	10%	10%	10%	10%	25%	25%	25%
WFP tested clones				18%	18%	18%	18%	18%	18%	18%
MoF FS/VP							12%	12%	12%	12%
TW (MB) OP FS/VP	5%	5%	10%	10%	10%	10%	10%	25%	25%	25%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.3	0.5	0.8	1.3	1.5	1.5	1.8	2.0	2.0	2.0
Total gain	5%	5%	10%	12%	13%	13%	13%	20%	20%	20%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 11YcM24JULY2000

ORCHARDS

***Chamaecyparis nootkatensis* - Yellow Cedar (M)**

11 Yc M **400-1200 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Saanich FC	164	20	?	140	?		??	??	
Mt Newton	138	133	?	678	?		??	??	
McBean	137	retired/moved?							
		Total ramets		**818**	**0**	F15	**Total production**	**0.000**	I15

Vegetative propagation

Stecklings/Emblings **2.0** I17

Total production **2.0** I19

Current deficiencies in rooted cutings made up by wild seed collections. Virtually all planting stock will eventually come from vegetatively propagated superior clones.

Annual planting	**1.100**	I21	
Surplus	**0.900**	I22	I19-I21
Ramets required		I23	I21*1,000,000/F27
Ramets required with over-capacity		I24	I23*1.2
Projected necessary expansion			I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet =		F27
Planned over-production capacity =		
Seed weight		seeds/g
Seedling recovery factor		seedlings/seed

Conclusions: Seed orchards not used for bulk seed production only foundation stock for clonal testing and cutting hedge establishment.

File 11YcM24JULY2000

ACTIVITIES

Chamaecyparis nootkatensis - Yellow Cedar (M)

11 Yc M 400-1200 m Prog. Tst Value Rank: 11/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 1.100	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**PERFORMANCE INDICATORS**
210 Selection											
1 Families selected for breeding arboreta	30					10	10		10	Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)		400	100				100	100		Breeding populations established	Number of ramets (1000)
2 Mating						60	30	30	30	Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design	1									Strategic and efficient mating and test design	Year design finalized
2 Establish	4	1								Progeny tests establ to design specifications	Number of test sites
3 Maintain	12	16	16	16	16	16	16	16	20	Progeny test trees free-growing	Number of test sites maintained
4 Measure			4	4		8	4		4	Sites measured as in strategy	Number of test sites measured
5 Analyze			1	1		2	1		1	Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Stability and maturation studies		2								Effective clonal forestry programs	Test sites established
2 Realized gain, deploy and comp trials		3								Validation of breeding & selection efforts	Sites established
3 Provenance trials (10-yr meas., maintain)		6	5							Decisions on seed transfer (up and down)	Provenance trial sites
4 Wood quality (form and durability)			1	1	1	1				Stem form and wood quality characterized	Study reports
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement			X	X	X	X	X	X	X	Ramets available for replacement	Number of grafts made
2 Ramet replacement		6,900	X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets replaced
3 Rogging			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets treated (50% of mature ramets)
5 Induction		100	X	X	X	X	X	X	X	Orchard production	Number of ramets induced (50% of mature ramets)
6 Orchard management/holding beds		14,410	X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control		11,810	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring			X	X	X	X	X	X	X	Full orchard production	Surveys conducted
350 Technical Support											
1 Hedge orchard improvement		1	X		X	X				Enhanced seed production	Report
2 Pollen management guidelines		1	X							Efficient orchard and CP seed production	Report
3											
4											
5											
6											
	Past Yr	Current Yr	Next Yr								

File 11YcM24JULY2000

BUDGETS

Chamaecyparis nootkatensis - Yellow Cedar (M)

11 Yc M 100-1200 r Prog. Tot Value Rank 11/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000S									TOTALS	
210 Selection											
› Families selected for breeding arboreta	0.0					0.0	0.0		0.0	0.0	
											0.0
220 Breed. Arboreta & Mating											
› Breeding arboreta (females)		15.7	5.0				5.0	5.0		30.7	
› Mating						0.0	0.0	0.0	0.0	0.0	
											30.7
230 Progeny testing											
› Design	0.0									0.0	
› Establish	120.0	13.0	10.0	10.0	10.0	25.0	80.0	80.0	80.0	428.0	
› Maintain	30.0	41.0	40.0	40.0	40.0	20.0	20.0	20.0	20.0	271.0	
› Measure			25.0	25.0		50.0	25.0		25.0	150.0	
› Analyze			0.0	0.0		0.0	0.0		0.0	0.0	
											849.0
240 Technical Support											
› Stability and maturation studies	5.0	12.0	10.0	20.0	10.0	5.0	5.0	5.0	5.0	77.0	
› Realized gain, deploy. and comp traits		33.0	120.0	20.0	20.0	10.0	5.0	5.0	5.0	218.0	
› Provenance trials (10-yr meas., maintain)		28.0	20.0	5.0	5.0					58.0	
› Wood quality (form and durability)			50.0	60.0						110.0	
›										0.0	
›											463.0
	155.0	142.7	280.0	180.0	85.0	110.0	140.0	115.0	135.0	Sub-TOT	1,342.7
300 SEED PRODUCTION											
310 Expanded Production											
› Grafting for new or expanded orchards										0.0	
› New orchards										0.0	
› Orchard expansions										0.0	
› Orchard management										0.0	
											0.0
320 Quality/Quantity Boosts											
› Grafting for ramet replacement			X	X	X	X	X	X	X	0.0	
› Ramet replacement		25.5	X	X	X	X	X	X	X	25.5	
› Rogging			X	X	X	X	X	X	X	0.0	
› SMP / CP			X	X	X	X	X	X	X	0.0	
› Induction		11.3	X	X	X	X	X	X	X	11.3	
› Orchard management/hunting bucks		12.5	X	X	X	X	X	X	X	12.5	
											49.3
330 Vegetative Propagation											
› Rooted cuttings										0.0	
› SE										0.0	
› Other										0.0	
											0.0
340 Pest Management											
› Insect control		0.7	X	X	X	X	X	X	X	0.7	
› Disease control			X	X	X	X	X	X	X	0.0	
› Monitoring			X	X	X	X	X	X	X	0.0	
											0.7
350 Technical Support											
› Hedge orchard improvement		19.1	X	X	X					19.1	
› Pollen management guidelines		12.7	X							12.7	
›											
›											
›											
›											
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	61.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
											31.8
GRAND TOTALS	155.0	224.4	280.0	180.0	85.0	110.0	140.0	115.0	135.0	1,424.4	81.7

1	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 01FdcMlow 20JULY2000

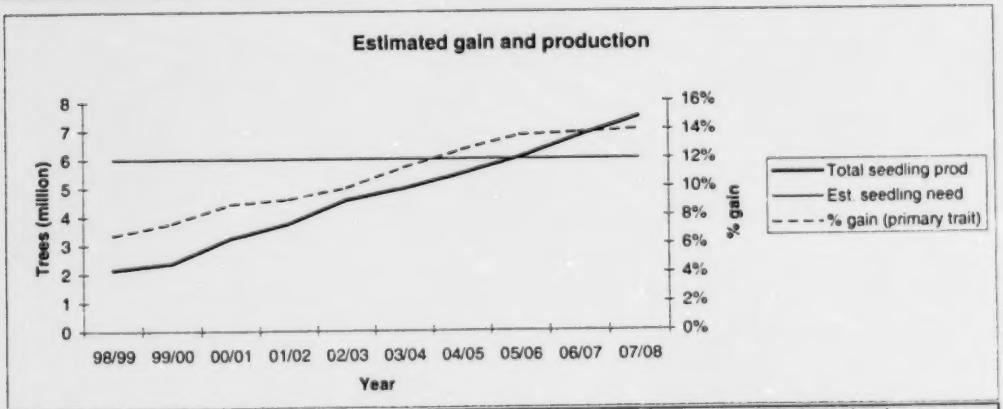
Pseudotsuga menziesii - Douglas-fir (M, low)

Fdc M low **0-700 m**

Seedling need (million):	6.0
Program total value rank:	1

Traits for improvement:	
Primary:	Stem volume
Secondary:	Wood density, stem form

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin.	110	110	110	110	110	110	110	110	110	110
Polycross	126	126	190	250	250	320	320	320	320	320
Clonal										
F1	372	372	372	372	372	372	372	372	372	372
F2	115	115	200	280	280	360	360	360	360	360
F3										60
Production capabilities (million plantables)										
Orchards (#, owner)										
134 TW	0.9	0.9	0.9	0.9	0.9	0.4	0.4	0.4	0.4	0.4
154 TW	0.8	0.8	0.8	0.8	0.8	0.8	0.4	0.4	0.4	0.4
166 WFP	0.0	0.7	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
149 MoF Bowser	0.5	0.0	0.4	0.6	0.8	0.9	0.9	0.5	0.5	0.5
162 MoF Bowser	0.0	0.0	0.7	0.9	1.1	1.5	2.0	2.4	2.4	2.4
177 CanFor	0.0	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.6	0.8
183 TW	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.8	0.9
New TW	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.9	1.3	1.8
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
134 TW	5%	5%	5%	5%	5%	9%	9%	9%	9%	9%
154 TW	7%	7%	7%	7%	7%	7%	11%	11%	11%	11%
166 WFP	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
149 MoF Bowser	9%	9%	9%	9%	9%	9%	9%	13%	13%	13%
162 MoF Bowser	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%
177 CanFor	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%
183 TW	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
New TW	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	2.2	2.4	3.2	3.7	4.6	5.0	5.5	6.0	6.8	7.4
Total gain	7%	8%	9%	9%	10%	11%	13%	14%	14%	14%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 01FdcMlow 20JULY2000

ORCHARDS

***Pseudotsuga menziesii* - Douglas-fir (M, low)**

1 Fdc M low **0-700 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Mt Newt	134	74	5%	1,214	703	19.7	1,300	**0.9**	
Mt Newt	154	45	18%	4,345	500	2.9	1,300	**0.7**	
Saanich FC	166*	40?	18%	314	314	1.8	1,300	**0.4**	
Bowser	149	424	13%	842	608	3.6	1,300	**0.8**	
Bowser	162	54	16%	2,000	1,850	10.9	1,300	**2.4**	
Sechelt	177	22	18%	550	900	5.3	1,300	**1.2**	
Mt Newt	183	63	18?%	718	718	4.2	1,300	**0.9**	
Mt Newt	New	??	18?%	2,500	1,297	7.6	1,300	**1.7**	
		Total ramets		**12,483**	**6,890**	F15	**Total production**	**8.957**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**9.0** I19

*Orchard 166 may be retired before 2008 if the land is needed.

Annual planting	**6.000** I21	
Surplus	**2.957** I22	I19-I21
Ramets required	**4,615** I23	I21*1,000,000/F27
Ramets required with over-capacity	**6,000** I24	I23*1.2
Projected necessary expansion	**0**	I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,300		F27
Planned over-production capacity = 1.3		
Seed weight	83	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Currently planned expansions are expected to meet long-term demand

File: 01FdcMlow 20JULY2000

ACTIVITIES

Pseudotsuga menziesii - Douglas-fir (M, low)

1 Fdc M low 0-700 m										Annual planting million	
Prog. Tot Value Rank 1/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	6.000	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta	18				60		50	50		Advanced generation selections made	Number of selections made
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)	180	220					300		300	Breeding populations established	Number of ramets
2 Mating	170	200	150	150	150	75				Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish			6		6					Progeny tests establ. to design specifications	Number of test sites
3 Maintain	6	6	12	18	18	24	18	18	12	Progeny test trees free-growing	Number of test sites maintained
4 Measure			2		6	2	4	6	4	Sites measured as in strategy	Number of test sites measured
5 Analyze			1		2	1	1	2	1	Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Realized-gain trials (series 2)	M6	ME2;A	M6	ME6;A	M6		ME6;A		M6	Planned activities done on time	Sites Maintained;sites MEasured;Analyze
2 Realized-gain trials (series 1)							ME2;A			Planned activities done on time	Sites Maintained;sites MEasured;Analyze
3 Provenance testing			A							Biologically correct seed zones	Sites MEasured; Analyse
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		2,400								Quantity or quality boosted	Number of ramets grafted
2 Ramet replacement		900								Genetic gain for primary trait	Number of ramets replaced
3 Roguing		0								Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP		1,094								Genetic gain for primary trait	Number of ramets treated
5 Induction		540								Orchard production	Number of ramets induced
6 Orchard management/holding beds		2,616								Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control										Full orchard production	Number of ramets treated
2 Disease control										Full orchard production	Number of ramets treated
3 Monitoring										Full orchard production	Number of ramets monitored
350 Technical Support											
1 D-f cone gall midge monitoring		1 report	Final report							Effective monitoring & control D-f cone gall midge	Report
2 Cp-DNA markers & seedlot rating		Final report								Accurate seedlot rating	Final report (4 chloroplast DNA markers)
3 Phellinus resistance										P.weirii genetic resist. strategy	Final report; resistant family list
4											
5											
6											
	Past Yr	Current Yr	Next Yr								

File 01FdcMlow 20JULY2000

BUDGETS

Pseudotsuga menziesii - Douglas-fir (M, low)

1 Fdc M low 0-700 m										
Prog. Tot Value Rank 1/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0
										0.0
220 Breed. Arboreta & Mating										
1 Breeding arboreta (ramets)										0.0
2 Mating										0.0
										0.0
230 Progeny testing										
1 Design										0.0
2 Establish			100.0		100.0					200.0
3 Maintain	40.0	48.4	70.0	80.0	80.0	90.0	70.0	70.0	60.0	608.4
4 Measure			15.0		35.0	15.0	30.0	35.0	30.0	160.0
5 Analyze			0.0		0.0	0.0	0.0	0.0	0.0	0.0
										968.4
240 Technical Support										
1 Realized-gain trials (series 2)	0.0	38.3	30.0	65.0	20.0		60.0		60.0	271.3
2 Realized-gain trials (series 1)							40.0			40.0
3 Provenance testing			20.0							20.0
4										0.0
5										0.0
6										0.0
										331.3
	40.0	84.6	235.0	145.0	235.0	105.0	200.0	105.0	150.0	*Sub-TOT* *1,299.6*
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement		10.0								10.0
2 Ramet replacement		10.0								10.0
3 Roguing										0.0
4 SMP / CP		25.0								25.0
5 Induction		3.7								3.7
6 Orchard management/holding beds		13.2								13.2
										61.7
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control										0.0
2 Disease control										0.0
3 Monitoring										0.0
										0.0
350 Technical Support										
1 D-f cone gall midge monitoring		25.5	25.0							50.5
2 Cp-DNA markers & seedlot rating		42.2								42.2
3 Phellinus resistance			X			X				0.0
4										
5										
6										
	Past Yr	Current Yr	Next Yr							
										92.7
SUB TOT	0.0	129.4	25.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	**40.0**	**214.1**	**260.0**	**145.0**	**235.0**	**105.0**	**200.0**	**105.0**	**150.0**	1,454.1 1,454.1

19 GENETIC IMPROVEMENT STRATEGY TIMELINE

File 19FdcSM24JULY2000

***Pseudotsuga menziesii* - Douglas-fir (SM)**

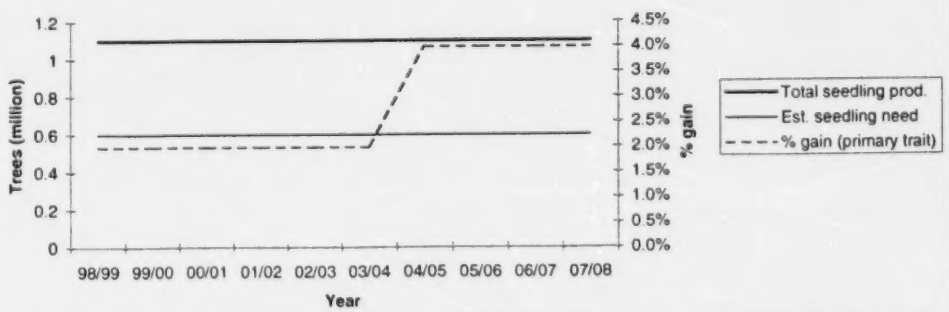
Fdc SM **200-1000 m**

Seedling need (million): 0.6
Program total value rank: 19

Traits for improvement:	
Primary	Stem volume
Secondary	Adaptive (frost and drought)

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin										
Polycross							70	120	120	120
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
120 MoF	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
120 MoF	2%	2%	2%	2%	2%	2%	4%	4%	4%	4%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total gain	2%	2%	2%	2%	2%	2%	4%	4%	4%	4%

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 19FdcSM24JULY2000

ORCHARDS

***Pseudotsuga menziesii* - Douglas-fir (SM)**

19 Fdc SM **200-1000 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Puckle Road	120	150	2%	1,280	1,280		1,300	**1.7**	I8
Puckle Road	To be determ.	about 40	?%	600					
									I15
		Total ramets		**1,880**	**1,280**	F16	**Total production**	**1.664**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
Orchard 120 does not produce seed suitable for northern part of SM zone. May need another orchard.	**Total production**	**1.7**	I20 I16+I18+I20

Orchard 120 seed may have potential in NE low.
Currently being rogued to supply seed for lower elevations in SM zone.

Annual planting	**0.600**	I22	
Surplus	**1.064**	I23	I20-I22
Ramets required	**462**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**600**	I25	I24*F29
Projected necessary expansion	**0**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,300		F28
Planned over-production capacity = 1.3		F29
Seed weight	83	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Decision on orchard replacement in 2002.

File: 19FdcSM24JULY2000

ACTIVITIES

Pseudotsuga menziesii - Douglas-fir (SM)

19 Fdc SM 200-1000 m Rank 19/43	Y2 99/00	Y3 00/01	Y4 01/02	Y5 02/03	Y6 03/04	Y7 04/05	Y8 05/06	Y9 06/07	Y10 07/08	Annual planting million 0.600	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of sele- tions made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets
2 Mating										Breeding strategy crosses made on time	Number of crosses
230 Progeny testing	Progeny testing dependent upon 2002 decision regarding program status										
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish										Progeny tests establ- to design specifications	Number of test sites
3 Maintain										Progeny test trees free-growing	Number of test sites maintained
4 Measure										Sites measured as in strategy	Number of test sites measured
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Genecology field study	M	6M	ME;A;R	M	ME;A		M		ME;A;R	Effective seed transfer guidelines	Sites Maintained, MEasured, Analyzed, Report
2 Genecology adaptive traits	ME;A	1R	ME;A;R							Effective seed transfer guidelines	Sites Maintained, MEasured, Analyzed, Report
3 Long term provenance tests		5ME					ME;A;R			Effective seed transfer guidelines	Sites Maintained, MEasured, Analyzed, Report
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Rogueing			X	X						Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP										Genetic gain for primary trait	Number of ramets treated
5 Induction		150	X	X						Orchard production	Number of ramets induced
6 Orchard management/hotdring beds		3,063	X	X						Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control			X	X						Full orchard production	Number of ramets treated
2 Disease control			X	X						Full orchard production	Number of ramets treated
3 Monitoring			X	X						Full orchard production	Number of ramets surveyed
350 Technical Support											
1 Orchard seed transfer			X							Orchard seed well adapted to seed zone	Report on seed transfer in SM
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File: 19FdcSM24JULY2000

BUDGETS

Pseudotsuga menziesii - Douglas-fir (SM)

19 Fdc SM 200-1000 m										
Prog. Tot Value Rank 19/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0
										0.0
220 Breed Arboreta & Mating										
1 Breeding arboreta (remnts)										0.0
2 Mating										0.0
										0.0
230 Progeny testing										
1 Design										0.0
2 Establish										0.0
3 Maintain										0.0
4 Measure										0.0
5 Analyze										0.0
										0.0
240 Technical Support										
1 Gamecology field study	25.0	12.9	40.0	10.0	25.0		10.0		25.0	147.9 Science Council
2 Gamecology adaptive tests	105.0	94.0	42.0							241.0 Funded
3 Long-term provenance tests		37.0					35.0			72.0
4										0.0
5										0.0
6										0.0 480.9
	130.0	143.9	82.0	10.0	25.0	0.0	45.0	0.0	25.0	Sub-TOT 480.9
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement										0.0
2 Ramet replacement										0.0
3 Rogging			X	X						0.0
4 SMP / CP										0.0
5 Induction		3.4	X	X						3.4
6 Orchard management/holding beds	X	8.4	X	X						8.4
										11.7
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control			X	X						0.0
2 Disease control			X	X						0.0
3 Monitoring			X	X						0.0
										0.0
350 Technical Support										
1										0.0
2										0.0
3										0.0
4										
5										
6										
	Past Yr	Current Yr	Next Yr							0.0
SUB TOT	0.0	11.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	130.0	155.6	82.0	10.0	25.0	0.0	45.0	0.0	25.0	472.6 472.6

21 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 21FdNElow19JULY2000.xls

Pseudotsuga menziesii - Interior Douglas-fir (NE, low)

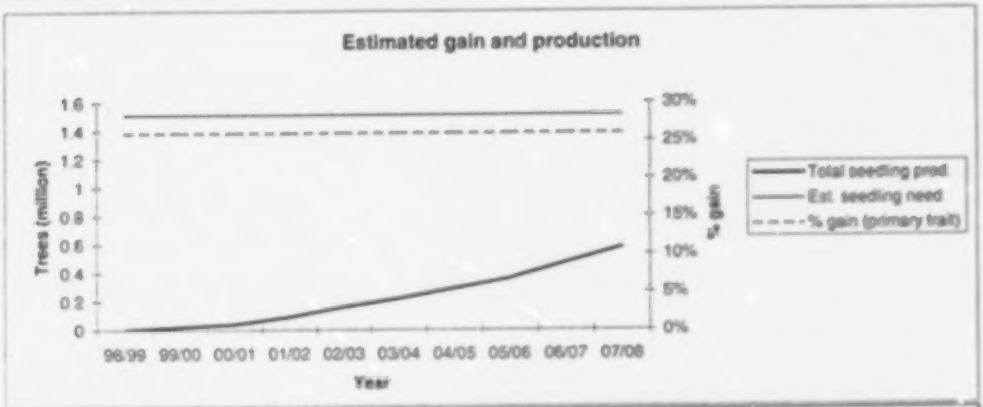
Fdi NE low **<1000 m**

Seedling need (million): 1.6

Program total value rank: 21

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, Armillaria resistance

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	541	541	541	541	541	541	541	541	541	541
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
321 PRT	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.6
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
321 PRT	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.6
Total gain	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 21FdiNElow19JULY2000.xls

ORCHARDS

***Pseudotsuga menziesii* - Interior Douglas-fir (NE, low)**

21 Fdi NE low **<1000 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
PRT	321	20	26%	449	449	12.2	1,300	**0.6**	I8
									I15
		Total ramets		**449**	**449**	F16	**Total production**	**0.584**	I16

SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings **0.0** I18

Total production **0.6** I20

I16+I18+I20

Fdi Species committee expects increased demand therefore orchard size is recommended at 2,200 ramets

Expansion of orchard 321 underway

Annual planting	**1.513**	I22
Deficit	**-0.929**	I23
Ramets required	**1,164**	I24
Ramets required with over-capacity	**2,200**	I25
Projected necessary expansion	**1,751**	

I20-I22

I22*1,000,000/F28

I24*F29

I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	**1,300**	F28
Planned over-production capacity =	**1.3**	F29
Seed weight	85.5	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Projected deficit requires expansion of existing orchards or new orchard.

File: 21FdNElow19JULY2000.xls

ACTIVITIES

Pseudotsuga menziesii - Interior Douglas-fir (NE, low)

21 Fdi NE low <1000 m										Annual planting million		
Prog. Tot Value Rank 21/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	1.513		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**	
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made	
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)	5									Breeding populations established	Number of ramets	
2 Mating		50	100	100	100					Breeding strategy crosses made on time	Number of crosses	
230 Progeny testing												
1 Design						2				Strategic and efficient mating and test design	Year design finalized	
2 Establish										Progeny tests establ. to design specifications	Number of test sites	
3 Maintain		4	4		4		4	4		Progeny test trees free-growing	Number of test sites maintained	
4 Measure		4	4		4		4	4		Sites measured as in strategy	Number of test sites measured	
5 Analyze			4		4		4			Test data analysis does not delay selections	Number of test series analyzed	
240 Technical Support												
1 Elevation transect study		3M	3M	3M	3M	3M	3M	3M	3M	Optimal breeding population	Trials Established, Maintained, Measesured	
2 Substanne sources & hybrids (screen)		3M	3M	3ME	3M	3M	3M	3ME	3M	Optimal breeding population	Trials Established, Maintained, Measesured	
3 Armillaria screening			200	200	200					Armillaria resistance in operational seedlots	Families screened	
4 Provenance tests		1								Seed sources optimal	Prov trial reports	
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards		63	275							Full production capacity	Number of grafts made	
2 New orchards										Full production capacity	Number of ramets established	
3 Orchard expansions	526	258	1,150	275						Full production capacity	Number of ramets established	
4 Orchard management		784	1,934	2,200	2,200	2,200	2,200	2,200	2,200	Productive orchard (higher GW seedlots)	Number of ramets maintained	
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made	
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced	
3 Rogueg										Genetic gain for primary trait	Number of ramets rogued	
4 SMP / CP							X	X	X	Genetic gain for primary trait	Number of ramets treated	
5 Induction						X	X	X	X	Orchard production	Number of ramets treated	
6 Orchard management/holding beds										Productive orchard	Number of ramets maintained	
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced	
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced	
3 Other										High genetic worth materials bulked up	Numbers of propagules produced	
340 Pest Management												
1 Insect control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
3 Monitoring			X	X	X	X	X	X	X	Full orchard production	Surveys conducted	
350 Technical Support												
1 Use of SM (with 130) in the NE			X	X	X	X	X	X	X	Best seed sources utilized	Guidelines for use of SM seed	
2 Nelson timber supply analysis		1								Understanding timber supply implications	Report	
3												
4												
5												
6												
	Past Yr	Current Yr	Next Yr									

File 21FdiNElow19JULY2000.xls

BUDGETS

Pseudotsuga menziesii - Interior Douglas-fir (NE, low)

21 Fdi NE low <1000 m Prog. Tot Value Rank 21/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									
210 Selection › Families selected for breeding arboreta										0.0 *0.0*
220 Breed Arboreta & Mating › Breeding arboreta (remeds) › Mating		6.0	5.0	5.0	5.0					0.0 21.0 *21.0*
230 Progeny testing › Design › Establish › Maintain › Measure › Analyze		30.0 30.0	28.0 28.0 0.0		28.0 28.0 0.0	50.0	28.0 28.0 0.0	28.0 28.0 0.0		0.0 50.0 142.0 142.0 0.0 *334.0*
240 Technical Support › Elevation transect study › Subcontract sources & hybrids (screen) › Amelioro screening › Provenance tests › ›	10.0 5.0 20.0	1.5 1.5 18.0	2.0 2.0 20.0	2.0 12.0 20.0	12.0 2.0 20.0	2.0 2.0	2.0 2.0 15.0	2.0 12.0	2.0 2.0	35.5 40.5 80.0 33.0 0.0 0.0 *189.0*
SUB TOT	35.0	87.0	85.0	39.0	95.0	54.0	75.0	70.0	4.0	*Sub-TOT* *544.0*
300 SEED PRODUCTION										
310 Expanded Production › Grafting for new or expanded orchards › New orchards › Orchard expansions › Orchard management										0.0 0.0 0.0 0.0 *0.0*
320 Quality/Quantity Boosts › Grafting for ramet replacement › Ramet replacement › Rogueing › SMP / CP › Induction › Orchard management/building tests						X	X X	X X	X X	0.0 0.0 0.0 0.0 0.0 0.0 *0.0*
330 Vegetative Propagation › Rooted cuttings › SE › Other										0.0 0.0 0.0 *0.0*
340 Pest Management › Insect control › Disease control › Monitoring			X X X	X X X	X X X	X X X	X X X	X X X	X X X	0.0 0.0 0.0 *0.0*
350 Technical Support › Use of SM (orch 1,65) in the NE › Reform timber supply analysis › › ›		5.0	X	X	X	X	X	X	X	0.0 5.0 0.0 *5.0*
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	35.0	92.0	85.0	39.0	95.0	54.0	75.0	70.0	4.0	549.0 544.0

22	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 22FdiNEhi 25JULY2000

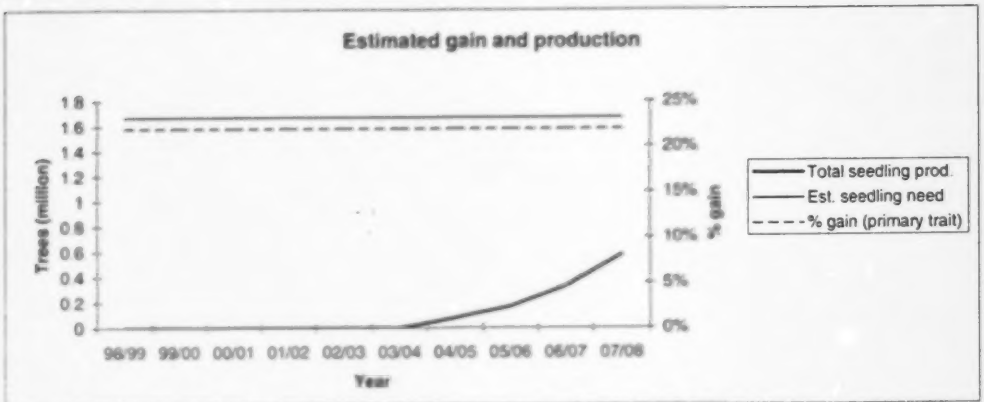
Pseudotsuga menziesii - Interior Douglas-fir (NE, high)

Fdi NE high **>1000 m**

Seedling need (million):	1.7
Program total value rank:	22

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, Armillaria resistance

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polln	208	208	208	208	208	208	208	208	208	208
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
324 MoF Bailey Rd	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.6
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
324 MoF Bailey Rd	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.6
Total gain	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 22FdiNEhi 25JULY2000

ORCHARDS

***Pseudotsuga menziesii* - Interior Douglas-fir (NE, high)**

22 Fdi NE high >1000 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Bailey Rd	324*	??	22%	1,671	1,671	45.4	1,300	**2.2**	I8
									I15
		Total ramets		**1,671**	**1,671**	F16	**Total production**	**2.172**	I16

SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings **0.0** I18

Total production **2.2** I20

I16+I18+I20

MoF establishing orchard at Bailey site

Annual planting	**1.671**	I22
Surplus	**0.501**	I23
Ramets required	**1,285**	I24
Ramets required with over-capacity	**1,671**	I25
Projected necessary expansion	**0**	

I20-I22

I22*1,000,000/F28

I24*F29

I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	**1,300**	F28
Planned over-production capacity =	**1.3**	F29
Seed weight	85.5	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Projected deficit requires establishment of new orchard. This will not reach full production until 2012/13.

File 22FdiNEhi 25JULY2000

ACTIVITIES

Pseudotsuga menziesii - Interior Douglas-fir (NE, high)

22 Fdi NE high >1000 m Prog. Tot Value Rank 22/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 1.671	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets
2 Mating		50	100	100	100					Breeding strategy crossee made on time	Number of crossee
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish									2	Progeny tests establ. to design specifications	Number of test sites
3 Maintain				4					4	Progeny test trees free-growing	Number of test sites maintained
4 Measure				4					4	Sites measured as in strategy	Number of test sites measured
5 Analyze				4					4	Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Wood density					1					Rankings for density	One study
2											
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards			X							Full production capacity	Number of grafts made
2 New orchards		X	X	X	X					Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management				X	X	X	X	X	X	Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Rogung										Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP										Genetic gain for primary trait	Number of ramets treated
5 Induction										Orchard production	Number of ramets treated
6 Orchard management/holding beds			X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control		1,512	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring		1512	X	X	X	X	X	X	X	Full orchard production	Number of ramets surveyed
350 Technical Support											
1											
2											
3											
4											
5											
6											
	Past Yr	Current Yr	Next Yr								

File 22FdiNEh 25JULY2000

BUDGETS

Pseudotsuga menziesii - Interior Douglas-fir (NE, high)

22 Fdl NE high >1000 m											
Prog. Tot Value Rank 22/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	**FRBC BUDGETS '000$**									**TOTALS**	
210 Selection											
1 Families selected for breeding arboreta										0.0	
											0.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)										0.0	
2 Mating		4.1	5.0	5.0	5.0					19.1	
											19.1
230 Progeny testing											
1 Design										0.0	
2 Establish									50.0	50.0	
3 Maintain				20.0					25.0	45.0	
4 Measure				30.0					30.0	60.0	
5 Analyze				0.0					0.0	0.0	
											155.0
240 Technical Support											
1 Wood density					20.0					20.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	*20.0*
	0.0	4.1	5.0	55.0	25.0	0.0	0.0	0.0	105.0	*Sub-TOT*	*194.1*
300 SEED PRODUCTION											
310 Expanded Production		MoF establishing orchard									
1 Grafting for new or expanded orchards			X							0.0	
2 New orchards		X	X	X	X					0.0	
3 Orchard expansions										0.0	
4 Orchard management				X	X	X	X	X	X	0.0	
											0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										0.0	
2 Ramet replacement										0.0	
3 Rogung										0.0	
4 SMP / CP										0.0	
5 Induction										0.0	
6 Orchard management/holding beds			X	X	X	X	X	X	X	0.0	
											0.0
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control		0.5	X	X	X	X	X	X	X	0.5	
2 Disease control			X	X	X	X	X	X	X	0.0	
3 Monitoring		0.5	X	X	X	X	X	X	X	0.5	
											1.0
350 Technical Support											
1											
2											
3											
4											
5											
6											*0.0*
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	**0.0**	**5.1**	**5.0**	**55.0**	**25.0**	**0.0**	**0.0**	**0.0**	**105.0**	**195.1**	**195.1**

31 GENETIC IMPROVEMENT STRATEGY TIMELINE

File 31FdcMhigh19JULY2000.xls

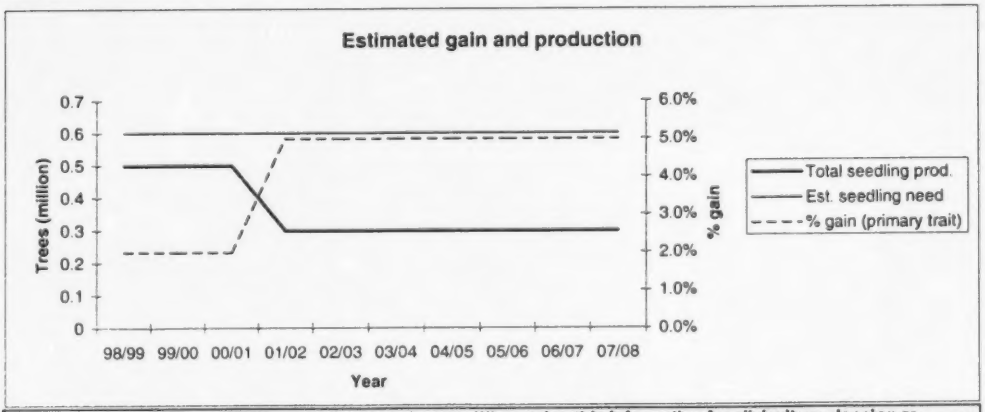
Pseudotsuga menziesii - Coastal Douglas-fir (M, high)

Fdc M high **700+ m**

Seedling need (million):	0.6
Program total value rank:	31

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density; form

	Year (April 1 to March 31)									
	98/99	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
Parents in progeny test:										
Open pollin										
Polycross	55	55	55	55	55	55	55	55	55	55
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
116 CanFor	0.5	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
116 CanFor	2%	2%	2%	5%	5%	5%	5%	5%	5%	5%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.5	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total gain	2%	2%	2%	5%	5%	5%	5%	5%	5%	5%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 31FdcMhigh19JULY2000.xls

ORCHARDS

***Pseudotsuga menziesii* - Coastal Douglas-fir (M, high)**

31 Fdc M high **700+ m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Sechelt	116	56	2%	390	390	10.9	1,300	**0.5**	I8
									I15
		Total ramets		**390**	**390**	F16	**Total production**	**0.507**	I16

SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings **0.0** I18

Total production **0.5** I20

I16+I18+I20

Annual planting	**0.600**	I22
Deficit	**-0.093**	I23
Ramets required	**462**	I24
Ramets required with over-capacity	**600**	I25
Projected necessary expansion	**210**	

I20-I22

I22*1,000,000/F28

I24*F29

I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,300		F28
Planned over-production capacity = 1.3		F29
Seed weight	83	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Progeny and provenance test results will provide data on elevation boundary in 2002; defer orchard expansion decision until after this time.
Currently planned expansions are expected to meet long-term demand

File: 31FdcMhigh19JULY2000.xls

ACTIVITIES

Pseudotsuga menziesii - Coastal Douglas-fir (M, high)

31 Fdc M high 700+ m Rank 31/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 0.600	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets
2 Mating										Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish										Progeny tests establ. to design specifications	Number of test sites
3 Maintain	2	2	2		2	2		2	2	Progeny test trees free-growing	Number of test sites maintained
4 Measure				2					2	Sites measured as in strategy	Number of test sites measured
5 Analyze				1						Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Provenance test assessment (EP 599)		ME1								Biologically correct seed zones	Sites MEasured; Analyse; Report;Maintained
2 Cold hardiness genecology (physiol testing)			ME;A;R	ME;A;R						Biologically correct seed zones	Sites MEasured; Analyse; Report
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Rogung			X	X						Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP			X	X						Genetic gain for primary trait	Number of ramets treated
5 Induction			X	X						Orchard production	Number of ramets induced
6 Orchard management/holding beds			X	X						Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control			X	X						Full orchard production	Number of ramets treated
2 Disease control			X	X						Full orchard production	Number of ramets treated
3 Monitoring			X	X						Full orchard production	Surveys conducted
350 Technical Support											
1											
2											
3											
4											
5											
6											
	Past Yr	Current Yr	Next Yr								

File 31FdcMhigh19JULY2000.xls

BUDGETS

Pseudotsuga menziesii - Coastal Douglas-fir (M, high)

31 Fdc M high 700+ m Prog. Tot Value Rank 31/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$										
210 Selection										0.0	
1 Families selected for breeding arboreta											0.0
220 Breed. Arboreta & Mating										0.0	
1 Breeding arboreta (remeta)										0.0	
2 Mating											0.0
230 Progeny testing										0.0	
1 Design										0.0	
2 Establish	3.0	6.2	3.0		6.0	4.0		3.0	3.0	26.2	
3 Maintain				15.0					2.0	17.0	
4 Measure				15.0						15.0	
5 Analyze											60.2
240 Technical Support										45.1	
1 Provenance test assessment (EP 589)		5.1	40.0							70.0	
2 Cold hardiness genecology (physiol. testing)			70.0							0.0	
3										0.0	
4										0.0	
5										0.0	
6											115.1
SUB TOT	3.0	11.3	113.0	30.0	6.0	4.0	0.0	3.0	5.0	*Sub-TOT*	175.3
300 SEED PRODUCTION											
310 Expanded Production										0.0	
1 Grafting for new or expanded orchards	Decision (2002) re. elev. boundary and orchard construction									0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management											0.0
320 Quality/Quantity Boosts										0.0	
1 Grafting to ramet replacement										0.0	
2 Ramet replacement		X	X	X						0.0	
3 Rogging		X	X	X						0.0	
4 SMP / CP		X	X	X						0.0	
5 Induction		X	X	X						0.0	
6 Orchard management/holding beds											0.0
330 Vegetative Propagation										0.0	
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other											0.0
340 Pest Management										0.0	
1 Insect control		X	X	X						0.0	
2 Disease control		X	X	X						0.0	
3 Monitoring											0.0
350 Technical Support										0.0	
1										0.0	
2										0.0	
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								0.0
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	3.0	11.3	113.0	30.0	6.0	4.0	0.0	3.0	5.0	175.3	175.3

37 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 37Fd/QLall19JULY2000

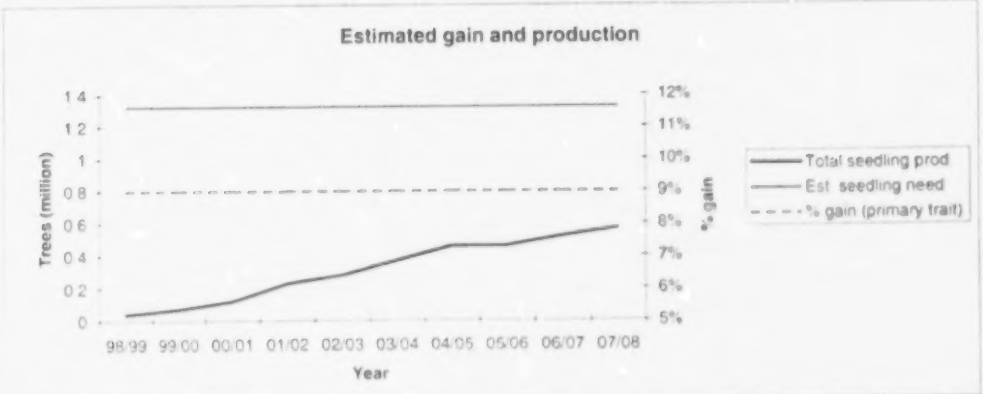
Pseudotsuga menziesii - Interior Douglas-fir (QL,all)

Fdi QL **all elev.**

Seedling need (million): 1.3
Program total value rank: 37

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	364	364	364	364	364	364	364	364	364	364
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
226 VSOC	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.5	0.5	0.5
GenSeed Expansion					0.0	0.0	0.0	0.0	0.1	0.1
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
226 VSOC	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%
GenSeed Expansion					9%	9%	9%	9%	9%	9%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.5	0.5	0.6
Total gain	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File 37FdiQLall19JULY2000

ORCHARDS

***Pseudotsuga menziesii* - Interior Douglas-fir (QL,all)**

37 Fdi QL **all elev.**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
VSOC	226	42	19%	351	351	9.5	1,300	0.5	I8
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	I15
		Total ramets		**351**	**351**	F16	**Total production**	**0.456**	I16

SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings **0.0** I18

Total production **0.5** I20

I16+I18+I20

Annual planting	**1.326**	I22
Deficit	**-0.870**	I23
Ramets required	**1,020**	I24
Ramets required with over-capacity	**1,326**	I25
Projected necessary expansion	**975**	

I20-I22

I22*1,000,000/F28

I24*F29

I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,300		F28
Planned over-production capacity = 1.3		F29
Seed weight	85.5	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Projected deficit requires expansion of existing orchards or new orchard.

File: 37FdiQLall19JULY2000

ACTIVITIES

Pseudotsuga menziesii - Interior Douglas-fir (QL all)

37 Fdi QL all elev.										Annual planting million		
Prog. Tot Value Rank 37/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	1.335		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**PERFORMANCE INDICATORS**
210 Selection										Advanced generation selections made		Number of selections made
220 Breed Arboreta & Mating › Breeding arboreta (ramets) › Mating		30	75	75	75					Breeding populations established Breeding strategy crosses made on time		Number of ramets Number of crosses
230 Progeny testing › Design › Establish › Maintain › Measure › Analyze	4 4 4					4 4 4	2		2	Strategic and efficient mating and test design Progeny tests establ. to design specifications Progeny test trees free-growing Sites measured as in strategy Test data analysis does not delay selections		Year design finalized Number of test sites Number of test sites maintained Number of test sites measured Number of test series analyzed
240 Technical Support › Wood density › › › › ›				1						Density used in selection Appropriate seed transfer guidelines		Report and list of family mean basic density Report
300 SEED PRODUCTION												
310 Expanded Production › Grafting for new or expanded orchards › New orchards › Orchard expansions › Orchard management		90	X	X X X X	X X X X	X X X X	X	X	X	Full production capacity Full production capacity Full production capacity Productive orchard (higher GW seedlots)		Number of grafts made Number of ramets established Number of ramets established Number of ramets maintained
320 Quality/Quantity Boosts › Grafting for ramet replacement › Ramet replacement › Rogging › SMP / CF › Induction › Orchard management/hedging roots		100	X X X X X	X X X X X	X X X X X	X X X X X	X X X	X X X	X X X	Ramets available for replacement Genetic gain for primary trait Genetic gain for primary trait Genetic gain for primary trait Orchard production Productive orchard		Number of grafts made Number of ramets replaced Number of ramets rogued Number of ramets induced Number of ramets induced Number of ramets maintained
330 Vegetative Propagation › Rooted cuttings › GE › Other										High genetic worth materials bulked up High genetic worth materials bulked up High genetic worth materials bulked up		Millions of rooted cuttings produced Thousands of somatic seedlings produced Numbers of propagules produced
340 Pest Management › Insect control › Disease control › Monitoring		351 351	X X X	X X X	X X X	X X X	X X X	X X X	X X X	Full orchard production Full orchard production Full orchard production		Number of ramets treated Number of ramets treated Surveys conducted
350 Technical Support › › Phenology assessments › › › ›	Past Yr	1 report Current Yr	Next Yr							Efficient orchard operations		Report

File: 37FdiQLall19JUL72000

BUDGETS

Pseudotsuga menziesii - Interior Douglas-fir (QL,all)

37 Fdl QL all elev.											
Prog. Tot Value Rank 37/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta										0.0	
											0.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)										0.0	
2 Mating		4.1	5.0	5.0	5.0					19.1	
											19.1
230 Progeny testing											
1 Design										0.0	
2 Establish							40.0			40.0	
3 Maintain	20.0					20.0			15.0	55.0	
4 Measure	20.0					20.0				40.0	
5 Analyze	0.0					0.0				0.0	
											135.0
240 Technical Support											
1 Wood density				1.0						1.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	1.0
	40.0	4.1	5.0	6.0	5.0	40.0	40.0	0.0	15.0	*Sub-TOT*	155.1
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards		X	X	X	X	X				0.0	
2 New orchards				X	X	X				0.0	
3 Orchard expansions				X	X	X				0.0	
4 Orchard management				X	X	X	X	X	X	0.0	
											0.000
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement			X	X	X					0.0	
2 Ramet replacement			X	X	X	X				0.0	
3 Rogueing										0.0	
4 SMP / CP		1.0	X	X	X	X	X	X	X	1.0	
5 Induction			X	X	X	X	X	X	X	0.0	
6 Orchard management/holding beds			X	X	X	X	X	X	X	0.0	
											1.033
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.000
340 Pest Management											
1 Insect control		0.4	X	X	X	X	X	X	X	0.4	
2 Disease control		0.4	X	X	X	X	X	X	X	0.4	
3 Monitoring			X	X	X	X	X	X	X	0.0	
											0.850
350 Technical Support											
1											
2 Phenology assessments		0.4								0.4	
3											
4											
5											
6											0.400
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	40.0	6.4	5.0	6.0	5.0	40.0	40.0	0.0	15.0	157.4	157.4

39 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 39FdiEKall19JULY2000

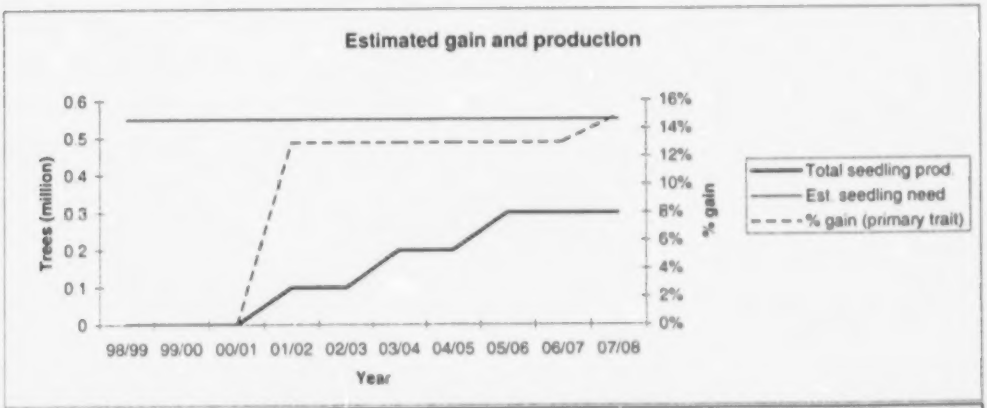
Pseudotsuga menziesii - Interior Douglas-fir (EK, all)

Fdi EK **all elev.**

Seedling need (million):	0.6
Program total value rank:	39

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	198	198	198	198	198	198	198	198	198	198
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
Breed orchard at Kal	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.3
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
Breed orchard at Kal	0%	0%	0%	13%	13%	13%	13%	13%	13%	15%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.3
Total gain	0%	0%	0%	13%	13%	13%	13%	13%	13%	15%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 39FdiEKall19JULY2000

ORCHARDS

***Pseudotsuga menziesii* - Interior Douglas-fir (EK, all)**

39 Fdi EK **all elev.**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
None: Breeding orchard at Kalamalka used for seed production									I8
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	I15
		Total ramets		0	0	F16	**Total production**	0.000	I16

SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	0.0	I18
	Total production	0.0	I20

I16+I18+I20

Annual planting	0.550	I22
Deficit	-0.550	I23
Ramets required	423	I24
Ramets required with over-capacity	550	I25
Projected necessary expansion	550	

I20-I22

I22*1,000,000/F28

I24*F29

I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,300		F28
Planned over-production capacity = 1.3		F29
Seed weight	85.5	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: No orchard planned. Seed production in breeding orchard.

File 39FdEKall19JULY2000

ACTIVITIES

Pseudotsuga menziesii - Interior Douglas-fir (EK, all)

39 Fd EK all elev.										Annual planting million		
Prog. Tot Value Rank 29/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	0.550		
300 bREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS	KPI DESCRIPTION	
210 Selection 1 Families selected for breeding arboreta				100						Advanced generation selections made	Number of selections made	
220 Breed Arboreta & Mating 1 Breeding arboreta (ramets) 2 Mating						200				Breeding populations established Breeding strategy crosses made on time	Number of ramets (1000) Number of crosses	
230 Progeny testing 1 Design 2 Establish 3 Maintain 4 Measure 5 Analyze			5 5					5 5		Strategic and efficient mating and test design Progeny tests adapt. to design specifications Progeny test trees free-growing Sites measured as in strategy Test data analysis does not delay selections	Year design finalized Number of test sites Number of test sites maintained Number of test sites measured Number of test series analyzed	
240 Technical Support 1 Wood density 2 3 4 5 6		200								Parents selected have high wood quality	Number of families screened	
300 SEED PRODUCTION												
310 Expanded Production 1 Grafting for new or expanded orchards 2 New orchards 3 Orchard expansions 4 Orchard management				500	550	550	550	550	550	Full production capacity Full production capacity Full production capacity Productive orchard (higher GW seedlots)	Number of grafts made Number of ramets established Number of ramets established Number of ramets maintained	
320 Quality/Quantity Boosts 1 Grafting for ramet replacement 2 Ramet replacement 3 Rogueing 4 SMP / DP 5 Inoculation 6 Orchard management/holding beds			X X X	X X X	X X X	X X X	X X X	X X X	X X X	Ramets available for replacement Genetic gain for primary trait Genetic gain for primary trait Genetic gain for primary trait Orchard production Productive orchard	Number of grafts made Number of ramets replaced Number of ramets rogued Number of ramets treated Number of ramets induced Number of ramets maintained	
330 Vegetative Propagation 1 Rooted cuttings 2 SE 3 Other										High genetic worth materials bulked up High genetic worth materials bulked up High genetic worth materials bulked up	Millions of rooted cuttings produced Thousands of somatic seedlings produced Numbers of propagules produced	
340 Pest Management 1 Insect control 2 Disease control 3 Monitoring										Full orchard production Full orchard production Full orchard production	Number of ramets treated Number of ramets treated Surveys conducted	
350 Technical Support 1 2 3 4 5 6	Past Yr	Current Yr	Next Yr									

Seed may be obtained from the Kalamalka breeding arboretum

File 39FdiEKall19JULY2000

Budgets

Pseudotsuga menziesii - Interior Douglas-fir (EK, all)

39 Fd! EK all elev.											
Prog. Tot Value Rank 39/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta				5.0						5.0	
											5.0
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)						5.0				5.0	
2 Mating										0.0	
											5.0
230 Progeny testing											
1 Design										0.0	
2 Establish										0.0	
3 Maintain			20.0					20.0		40.0	
4 Measure			20.0					20.0		40.0	
5 Analyze										0.0	
											80.0
240 Technical Support											
1 Wood density		17.5								17.5	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	17.5
SUB TOT	0.0	17.5	40.0	5.0	0.0	5.0	0.0	40.0	0.0	*Sub-TOT*	*107.5*
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards				X						0.0	
2 New orchards										0.0	
3 Orchard expansions					X					0.0	
4 Orchard management						X	X	X	X	0.0	
											0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										0.0	
2 Ramet replacement										0.0	
3 Rogung										0.0	
4 SMP / CP			X	X	X	X	X	X	X	0.0	
5 Induction			X	X	X	X	X	X	X	0.0	
6 Orchard management/holding beds			X	X	X	X	X	X	X	0.0	
											0.0
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control										0.0	
2 Disease control										0.0	
3 Monitoring										0.0	
											0.0
350 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4											
5											
6											
	Past Yr	Current Yr	Next Yr								0.0
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	0.0	17.5	40.0	5.0	0.0	5.0	0.0	40.0	0.0	107.5	107.5

41	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 41FdiPGall19JULY2000

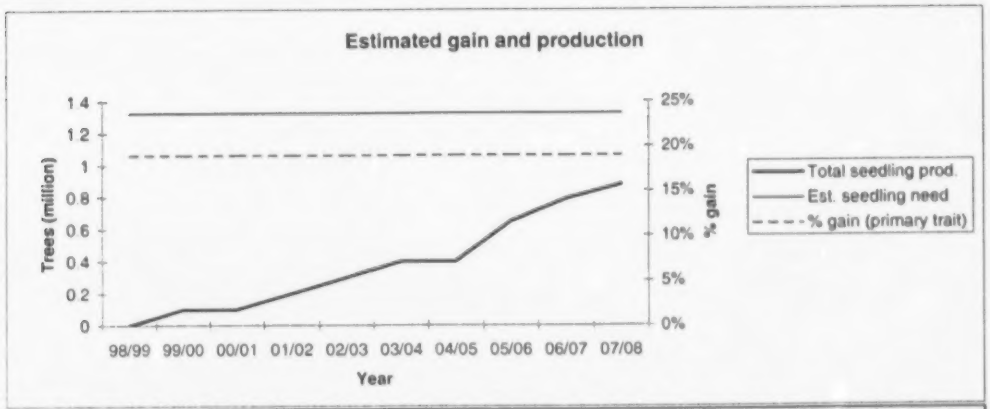
Pseudotsuga menziesii - Interior Douglas-fir (PG,all)

Fdi PG **all elev.**

Seedling need (million):	1.3
Program total value rank:	41

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	127	127	127	127	127	127	127	127	127	127
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
225 VSOC	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.6	0.7	0.7
GenSeed expansion				0.0	0.0	0.0	0.0	0.1	0.1	0.2
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
225 VSOC	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%
GenSeed expansion				19%	19%	19%	19%	19%	19%	19%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.7	0.8	0.9
Total gain	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 41FdiPGall19JULY2000

ORCHARDS

***Pseudotsuga menziesii* - Interior Douglas-fir (PG,all)**

41 Fdi PG **all elev.**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
VSOC	225	30	19%	540	540	14.7	1,300	0.7	I8
									I15
		Total ramets		540	540	F16	**Total production**	0.702	I16

SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings 0.0 I18

Total production 0.7 I20 I16+I18+I20

Species committee predicts increased demand; ordchard should be larger than historic seed use indicates.

Annual planting	1.326	I22	
Deficit	-0.624	I23	I20-I22
Ramets required	1,020	I24	I22*1,000,000/F28
Ramets required with over-capacity	1,326	I25	I24*F29
Projected necessary expansion	786		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	1,300	F28
Planned over-production capacity =	1.3	F29
Seed weight	85.5	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Projected deficit requires expansion of existing orchards or new orchard.

File: 41FdiPGall19JULY2000

ACTIVITIES

Pseudotsuga menziesii - Interior Douglas-fir (PG,all)

41 Fdl PG all elev.										Annual planting million		
Prog. Tot Value Rank 41/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	1.326		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**	
210 Selection												
1 Families selected for breeding arboreta							80			Advanced generation selections made	Number of selections made	
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)									240	Breeding populations established	Number of ramets	
2 Mating										Breeding strategy crosses made on time	Number of crosses	
230 Progeny testing												
1 Design										Strategic and efficient mating and test design	Year design finalized	
2 Establish										Progeny tests establ. to design specifications	Number of test sites	
3 Maintain	4					4				Progeny test trees free-growing	Number of test sites maintained	
4 Measure	4					4				Sites measured as in strategy	Number of test sites measured	
5 Analyze	4					4				Test data analysis does not delay selections	Number of test series analyzed	
240 Technical Support												
1												
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards		1,156	X	X	X	X				Full production capacity	Number of grafts made	
2 New orchards				X	X	X				Full production capacity	Number of ramets established	
3 Orchard expansions				X	X	X				Full production capacity	Number of ramets established	
4 Orchard management				X	X	X	X	X	X	Productive orchard (higher GW seedlots)	Number of ramets maintained	
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement			X	X	X					Ramets available for replacement	Number of grafts made	
2 Ramet replacement			X	X	X	X				Genetic gain for primary trait	Number of ramets replaced	
3 Roguing										Genetic gain for primary trait	Number of ramets rogued	
4 SMP / CP		100	X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets treated	
5 Induction			X	X	X	X	X	X	X	Orchard production	Number of ramets induced	
6 Orchard management/holding beds			X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained	
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced	
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced	
3 Other										High genetic worth materials bulked up	Numbers of propagules produced	
340 Pest Management												
1 Insect control		540	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
2 Disease control		540	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
3 Monitoring			X	X	X	X	X	X	X	Full orchard production	Number of ramets monitored	
350 Technical Support												
1												
2 Phenology assessments		1 report								Efficient orchard operations	Report	
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File 41FdiPGall19JULY2000

BUDGETS

Pseudotsuga menziesii - Interior Douglas-fir (PG,all)

41 Fdi PG all elev.											
Prog. Tot Value Rank 41/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Females selected for breeding arboreta							4.0			4.0	4.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)									5.0	5.0	
2 Mating										0.0	5.0
230 Progeny testing											
1 Design										0.0	
2 Establish										0.0	
3 Maintain	12.0					15.0				27.0	
4 Measure	20.0					25.0				45.0	
5 Analyze	0.0					0.0				0.0	72.0
240 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	0.0
	32.0	0.0	0.0	0.0	0.0	40.0	4.0	0.0	5.0	*Sub-TOT*	*81.0*
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards		X	X	X	X	X				0.0	
2 New orchards				X	X	X				0.0	
3 Orchard expansions				X	X	X				0.0	
4 Orchard management				X	X	X	X	X	X	0.0	0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement			X	X	X					0.0	
2 Ramet replacement			X	X	X	X				0.0	
3 Rogiuing										0.0	
4 SMP / CP		0.7	X	X	X	X	X	X	X	0.7	
5 Induction			X	X	X	X	X	X	X	0.0	
6 Orchard management/holding beds			X	X	X	X	X	X	X	0.0	0.678
330 Vegetative Propagation											
1 Rooted cuttings		0.0								0.0	
2 SE										0.0	
3 Other										0.0	0.000
340 Pest Management											
1 Insect control		0.5	X	X	X	X	X	X	X	0.5	
2 Disease control		0.5	X	X	X	X	X	X	X	0.5	
3 Monitoring			X	X	X	X	X	X	X	0.0	1.050
350 Technical Support											
1											
2 Phenology assessments		0.4								0.4	
3											
4											
5											
6											0.400
SUB TOT	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	32.0	2.1	0.0	0.0	0.0	40.0	4.0	0.0	5.0	83.1	83.1

43	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 43FdiCTall20JULY2000

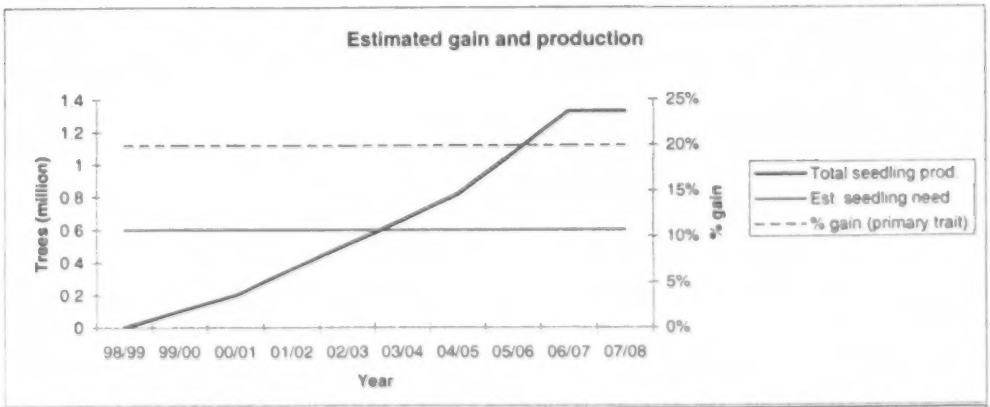
Pseudotsuga menziesii - Interior Douglas-fir (CT, all)

Fdi CT **all elev.**

Seedling need (million):	0.6
Program total value rank:	43

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	214	214	214	214	214	214	214	214	214	214
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
231 VSOC	0.0	0.1	0.2	0.4	0.5	0.7	0.8	1.1	1.3	1.3
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
231 VSOC	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.1	0.2	0.4	0.5	0.7	0.8	1.1	1.3	1.3
Total gain	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File 43FdiCTall20JULY2000

ORCHARDS

***Pseudotsuga menziesii* - Interior Douglas-fir (CT, all)**

43 Fdi CT **all elev.**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
VSOC	231	43	20%	1,020	1,020	27.7	1,300	1.3	I8
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	I15
		Total ramets		1,020	1,020	F16	**Total production**	1.326	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	0.0	I18
	Total production	1.3	I20 I16+I18+I20

Annual planting	0.600	I22	
Surplus	0.726	I23	I20-I22
Ramets required	462	I24	I22*1,000,000/F28
Ramets required with over-capacity	600	I25	I24*F29
Projected necessary expansion	0		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	1,300	F28
Planned over-production capacity =	1.3	F29
Seed weight	85.5	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Projected surplus for SPZ.

File 43FdiCTall20JULY2000

ACTIVITIES

Pseudotsuga menziesii - Interior Douglas-fir (CT, all)

43 Fdi CT all elev.										Annual planting million		
Prog. Tot Value Rank 43/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	0.600		
200 BREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS	KPI DESCRIPTION	
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made	
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)		40	100	100	100					Breeding populations established	Number of ramets	
2 Mating										Breeding strategy crosses made on time	Number of crosses	
230 Progeny testing												
1 Design										Strategic and efficient mating and test design	Year design finalized	
2 Establish							2			Progeny tests establ to design specifications	Number of test sites	
3 Maintain			3	2				3	2	Progeny test trees free-growing	Number of test sites maintained	
4 Measure			3	2				3	2	Sites measured as in strategy	Number of test sites measured	
5 Analyze			3	2				3	2	Test data analysis does not delay selections	Number of test series analyzed	
240 Technical Support												
1												
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made	
2 New orchards										Full production capacity	Number of ramets established	
3 Orchard expansions										Full production capacity	Number of ramets established	
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained	
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement			X	X						Ramets available for replacement	Number of grafts made	
2 Ramet replacement			X	X						Genetic gain for primary trait	Number of ramets replaced	
3 Roguing				X	X	X	X	X		Genetic gain for primary trait	Number of ramets rogued	
4 SMP / CP		200	X	X	X	X	X	X		Genetic gain for primary trait	Number of ramets treated	
5 Induction			X	X	X	X	X	X	X	Orchard production	Number of ramets induced	
6 Orchard management/hotding beds			X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained	
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced	
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced	
3 Other										High genetic worth materials bulked up	Numbers of propagules produced	
340 Pest Management												
1 Insect control		1050	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
2 Disease control		1050	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
3 Monitoring			X	X	X	X	X	X	X	Full orchard production	Number of ramets surveyed	
350 Technical Support												
1												
2 Phenology assessments		1 report								Efficient orchard operations	Report	
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File: 43FdiCTall20JULY2000

BUDGETS

Pseudotsuga menziesii - Interior Douglas-fir (CT, all)

43 Fdi CT all elev.											
Prog. Tot Value Rank 43/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta										0.0	
											0.0
220 Breed Arboreta & Mating											
1 Breeding arboreta (remeta)										0.0	
2 Mating		16.5	5.0	5.0	5.0					31.5	
											31.5
230 Progeny testing											
1 Design										0.0	
2 Establish							35.0			35.0	
3 Maintain			15.0	10.0				15.0	10.0	50.0	
4 Measure			15.0	20.0				20.0	20.0	75.0	
5 Analyze			0.0	0.0				0.0	0.0	0.0	
											160.0
240 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	
SUB TOT	0.0	16.5	35.0	35.0	5.0	0.0	35.0	35.0	30.0	0.0	0.0
300 SEED PRODUCTION										Sub-TOT	191.5
310 Expanded Production											
1 Grafting for new or expanded orchards											
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management										0.0	
										0.0	0.0
320 Quality/Quantity Boosts											
1 Grafting for roguing			X	X						0.0	
2 Roguing			X	X						0.0	
3 Pollen collection				X	X	X	X	X		0.0	
4 SMP / CP		2.2	X	X	X	X	X	X	X	2.2	
5 Pollination			X	X	X	X	X	X	X	0.0	
6 Orchard management/rotating bank			X	X	X	X	X	X	X	0.0	
											2.2
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control		0.5	X	X	X	X	X	X	X	0.5	
2 Disease control		0.5	X	X	X	X	X	X	X	0.5	
3 Monitoring			X	X	X	X	X	X	X	0.0	
											1.1
350 Technical Support											
1											
2 Phenology assessments		1.0								1.0	
3											
4											
5											
6											
SUB TOT	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1.0
GRAND TOTALS	0.0	20.8	35.0	35.0	5.0	0.0	35.0	35.0	30.0	195.8	195.8

3	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 03HwMlow 20JULY2000

Tsuga heterophylla - Western Hemlock (M, low)

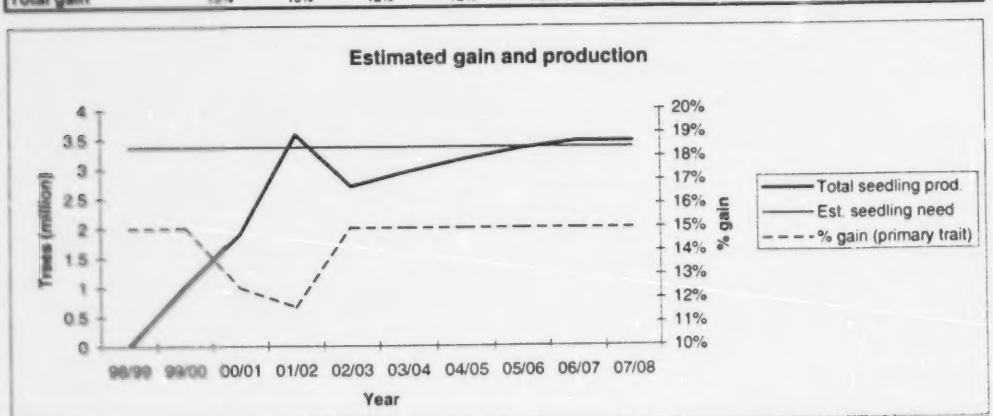
Hw M low 0-700 m

Seedling need (million): 3.4

Program total value rank: 3

Traits for improvement:	
Primary	Stem volume
Secondary	Stem form, Wood quality

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	150	150	150	150						
Polycross	300	300	300	300	300	500	500	500	500	300
Clonal										
F1	700	900	900	900	900	900	900	900	900	900
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
170 WFP	0.0	0.5	0.5	0.6	1.3	1.3	1.3	1.3	1.3	1.3
179 Canlor	0.0	0.4	0.5	0.9	1.1	1.3	1.3	1.3	1.3	1.3
182 TW	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.8	0.9	0.9
126 WFP			0.8	2.0						
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
170 WFP	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
179 Canlor	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
182 TW	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
126 WFP			9%	9%						
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	1.0	1.9	3.6	2.7	2.9	3.2	3.3	3.5	3.5
Total gain	15%	15%	12%	12%	15%	15%	15%	15%	15%	15%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 03HwMlow 20JULY2000

ORCHARDS

Tsuga heterophylla - Western Hemlock (M, low)

3 Hw M low **0-700 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings		
Sechelt	134	122	Orchard retired							
McBean	132	120	Orchard retired							
Lost Lake	126	90	Orchard retired when site sells (some production 2000/01 and 01/02)							
Saanich FC	165	40	Orchard retired							
Lost Lake	176	54	Orchard retired when site sells							
Saanich FC	170*	39	15%	858	858	5.4	1,500	1.3		1.287
Sechelt	179	25	15%	300	850	5.3	1,500	1.3		1.275
Mt Newton	182	32	14%	590	590	3.7	1,500	0.9		0.885
		Total ramets		**1,748**	**2,298**	F15	**Total production**	**3.447**	I15	

Vegetative propagation

Stecklings/Emblings	**0.0**	I17	
Total production	**3.4**	I19	

*Orchard 170 was reconfigured in 1998 and was to have been re-registered in 1999 and possibly assigned new orchard number. However it was vandalized in 1999 and was reconstituted in 2000. It will be reestablished by interplanting at the same final density so that long range productivity will not be impaired.

Annual planting	**3.365**	I21	
Surplus	**0.082**	I22	I19-I21
Ramets required	**2,243**	I23	I21*1,000,000/F27
Ramets required with over-capacity	**2,916**	I24	I23*1.2
Projected necessary expansion	**618**		I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,500		F27
Planned over-production capacity = 1.3		
Seed weight	429	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Moderate expansion required.

File 03HwMlow 20JULY2000

ACTIVITIES

Tsuga heterophylla - Western Hemlock (M, low)

3 Hw M low 0-700 m										Annual planting million		
Prog. Tot Value Rank 3/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	3.365		
300 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**	
310 Selection												
› Families selected for breeding arboreta		107	234	240	30		108	290	255	Advanced generation selections made	Number of selections made	
320 Breed Arboreta & Mating												
› Breeding arboreta (ramets)										Breeding populations established	Number of ramets	
› Mating	500	800	800	500	500	500	600	600	500	Breeding strategy crosses made on time	Number of crosses (isolations)	
330 Progeny testing												
› Design										Strategic and efficient mating and test design	Year design finalized	
› Establish	5	4	4	4	4				4	Progeny tests establ. to design specifications	Number of test sites	
› Maintain	40	40	40	40	40	40	30	25	25	Progeny test trees free-growing	Number of test sites maintained	
› Measure	9	11	14	7	4	12	7	21	5	Sites measured as in strategy	Number of test sites measured	
› Analyze	2	9	11	14	7	4	12	7	21	Test data analysis does not delay selections	Number of test series analyzed	
340 Technical Support												
› Ecophysiology		120	120							Adaptation of USA materials determined	Number of families screened	
› Shade tolerance testing		1			Report					Strategies for partial cutting	Study report	
› Provenance/elevational transfer		1				Report				Appropriate seed transfer	Test series established	
› Wood property screening		1		30			30	30	12	Families screened for density & fibre traits	Study report	
› Realized gain trials				10	5	10		15		Breeding gains verified, program validated	Number of trials measured	
›												
400 SEED PRODUCTION												
410 Expanded Production												
› Grafting for new or expanded orchards										Full production capacity	Number of grafts made	
› New orchards										Full production capacity	Number of ramets established	
› Orchard expansions										Full production capacity	Number of ramets established	
› Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained	
420 Quality/Quantity Boosts												
› Grafting for ramet replacement		1,827								Ramets available for replacement	Number of grafts made	
› Ramet replacement		463								Genetic gain for primary trait	Number of ramets replaced	
› Rogueing		0								Genetic gain for primary trait	Number of ramets rogued	
› SMP / CP		458								Genetic gain for primary trait	Number of ramets treated	
› Induction		170								Orchard production	Number of ramets induced	
› Orchard management/hosting beds		100								Productive orchard	Number of ramets maintained	
430 Vegetative Propagation												
› Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced	
› SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced	
› Other										High genetic worth materials bulked up	Numbers of propagules produced	
440 Pest Management												
› Insect control		1,877								Full orchard production	Number of ramets treated	
› Disease control										Full orchard production	Number of ramets treated	
› Monitoring										Full orchard production	Number of ramets surveyed	
450 Technical Support												
› Finger printing (SMP efficiency & selfing)		1 report								Effective SMP higher seed set, lower contamin	SMP protocol	
› Selfing in orchards (microsatellite markers)		1 report								Effective biochemical fingerprinting	Biochem audit protocols	
› Selfing in orchards		1 report								Validate parental BV contrib., seedlot GW	Seedlot audit reports	
› Veg prop support		1 report								Good nursery cultural regime (hardiness & thinning)	Study report	
› Veg prop support (stock type trial)		1 report								Stock type decisions (rooted cuttings vs sdlgs)	Study report	
› Wood durability		1 report								Fiber morphometrics of breeding population	Study report (50 families)	
	Past Yr	Current Yr	Next Yr									

File: 03HwMlow 20JULY2000

BUDGETS

Tsuga heterophylla - Western Hemlock (M, low)

3 Hw M low 0-700 m											
Prog. Tot Value Rank 3/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta		1.0	1.0	1.0	1.0		1.0	1.0	1.0	7.0	7.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (remeta)										0.0	
2 Mating		4.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	88.0	88.0
230 Progeny testing											
1 Design										0.0	
2 Establish		63.0	60.0	60.0	40.0			20.0	60.0	303.0	
3 Maintain		28.0	30.0	30.0	30.0	30.0	20.0	15.0	15.0	198.0	
4 Measure		29.0	30.0	20.0	15.0	33.7	15.0	33.7	10.0	186.4	
5 Analyze		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	8.0	695.4
240 Technical Support											
1 Ecophysiology		10.0	40.0							50.0	
2 Shade tolerance testing		25.0	5.0	3.0	3.0	5.0		3.0		44.0	
3 Provenance/elevational transfer		30.0	3.0	3.0	3.0		3.0			42.0	
4 Wood property screening		16.0		30.0			30.0	3.0	15.0	94.0	
5 Realized gain trials			10.0	0.0	5.0	0.0	0.0	15.0		30.0	
6											260.0
	0.0	207.0	192.0	160.0	110.0	81.7	82.0	103.7	114.0	*Sub-TOT*	1,050.4
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards											
2 New orchards											
3 Orchard expansions											
4 Orchard management											0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		6.8								6.8	
2 Ramet replacement		6.8								6.8	
3 Rogueing		6.8								6.8	
4 SMP / CP		6.8								6.8	
5 Induction		6.8								6.8	
6 Orchard management/holding beds		2.0								2.0	40.2
330 Vegetative Propagation											
1 Rooted cuttings											
2 SE											
3 Other											0.0
340 Pest Management											
1 Insect control		6.8								6.8	
2 Disease control											
3 Monitoring											6.8
350 Technical Support											
1 Finger pinning (SMP efficiency & selfing)		35.0								35.0	
2 Selfing in orchards (microsatellite markers)		34.7								34.7	
3 Selfing in orchards		7.8								7.8	
4 Veg prop support		7.7								7.7	
5 Veg prop support (stock type trial)		3.8								3.8	
6 Wood durability		32.7								32.7	
	Past Yr	Current Yr	Next Yr								121.5
SUB TOT	0.0	166.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0		166.5
GRAND TOTALS	0.0	375.6	192.0	160.0	110.0	81.7	82.0	103.7	114.0	1,219.0	1,219.0

24	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 24HwMhigh19JULY2000.xls

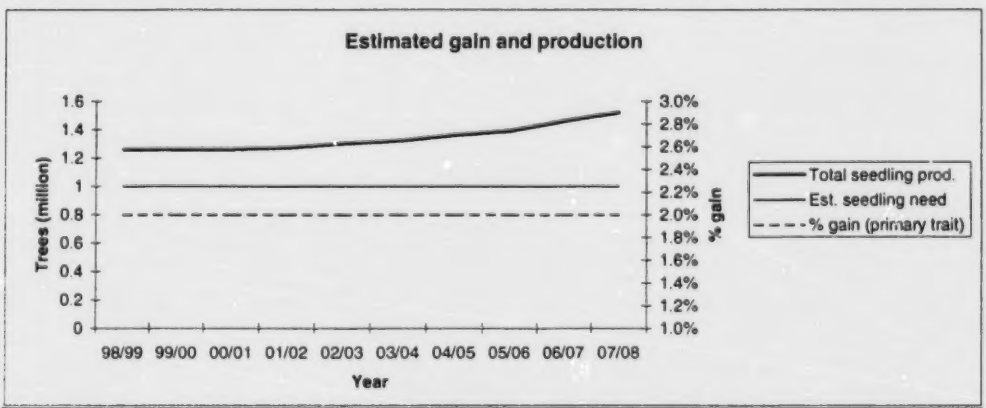
Tsuga heterophylla - Western Hemlock (M, high)

Hw M high **> 600 m**

Seedling need (million):	1.0
Program total value rank:	24

Traits for improvement:	
Primary	Stem volume
Secondary	Stem form, wood quality

	Year (April 1 to March 31)									
	98/99	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
Parents in progeny test:										
Open pollin										
Polycross	150	150	150	300	300	300	450	450	450	450
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
143 MoF (Quinsam)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
??? New Saanich FC	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
143 MoF (Quinsam)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
??? New Saanich FC	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5
Total gain	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 24HwMhigh19JULY2000.xls

ORCHARDS

Tsuga heterophylla - Western Hemlock (M, high)

24 Hw M high > 600 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Lost Lake	127	to be retired							I8
Quinsam	143	124	2%	1,680	841	5.3	1,500	1.3	
Saanich FC	New	40	2%*	200	200	1.2	1,500	0.3	
Mt Newton	130	retired						0.0	
Saanich FC	165	retired						0.0	
								0.0	
								0.0	
								0.0	I15
		Total ramets		**1,880**	**1,041**	F16	**Total production**	1.562	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	0.0	I18
	Total production	1.6	I20 I16+I18+I20
	Annual planting	1.000	I22
	Surplus	0.562	I23 I20-I22
	Ramets required	667	I24 I22*1,000,000/F28
	Ramets required with over-capacity	867	I25 I24*F29
	Projected necessary expansion	0	I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	1,500	F28
Planned over-production capacity =	1.3	F29
Seed weight	429	seeds/g
Seedling recovery factor	0.56	seedlings/seed

Conclusions: Sufficient capacity but may need new orchards for higher gain.

File: 24HwMhigh19JULY2000.xls

ACTIVITIES

Tsuga heterophylla - Western Hemlock (M, high)

24 Hw M high	> 500 m										Annual planting million		
Prog. Tot Value Rank	3/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	1.000		
290 BREEDING PROGRAMS		**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection													
1 Families selected for breeding arboreta		129	8	31		89	90		31		Advanced generation selections made		Number of selections made
220 Breed. Arboreta & Mating													
1 Breeding arboreta (ramets)											Breeding populations established		Number of ramets (1000)
2 Mating		350	400	400							Breeding strategy crosses made on time		Number of crosses
230 Progeny testing													
1 Design										4	Strategic and efficient mating and test design		Year design finalized
2 Establish				3	3						Progeny tests establ. to design specifications		Number of test sites
3 Maintain			5	3	6	6	3	3	3	3	Progeny test trees free-growing		Number of test sites maintained
4 Measure		3				2	3	3	3		Sites measured as in strategy		Number of test sites measured
5 Analyze		5	3			2		3	3	3	Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support													
1 Ecophysiology					One study						Materials screened for adaptation		Test series
2 Seed transfer study					One study		x	x	x	x	Low by high crosses tested		Test series
3 Realized gain trial					One study		x	x	x	x	Effectiveness of breeding assessed		Screen in large blocks (in conjunction with PT)
4													
5													
6													
300 SEED PRODUCTION													
310 Expanded Production													
1 Grafting for new or expanded orchards											Full production capacity		Number of grafts made
2 New orchards											Full production capacity		Number of ramets established
3 Orchard expansions											Full production capacity		Number of ramets established
4 Orchard management											Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts													
1 Grafting for ramet replacement											Ramets available for replacement		Number of grafts made
2 Ramet replacement											Genetic gain for primary trait		Number of ramets replaced
3 Roguing											Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP											Genetic gain for primary trait		Number of ramets treated
5 Induction				X	X	X	X	X	X	X	Orchard production		Number of ramets treated
6 Orchard management/holding beds				X	X	X	X	X	X	X	Productive orchard		Number of ramets maintained
330 Vegetative Propagation													
1 Rooted cuttings											High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE											High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other											High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management													
1 Insect control (adelgids & Leptoglossus)				X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
2 Disease control				X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
3 Monitoring				X	X	X	X	X	X	X	Full orchard production		Surveys conducted
350 Technical Support													
1													
2													
3													
4													
5													
6													
		Past Yr	Current Yr	Next Yr									

File 24HwMhigh19JULY2000.xls

BUDGETS

Tsuga heterophylla - Western Hemlock (M. high)

24 Hw M high > 600 m											
Prog. Tot Value Rank 3/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta		1.0	1.0		1.0	1.0		1.0		5.0	
											5.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (remeta)										0.0	
2 Mating		4.0	6.0							10.0	
											10.0
230 Progeny testing											
1 Design										0.0	
2 Establish			30.0	40.0					40.0	110.0	
3 Maintain		8.4	10.0	20.0	20.0					58.4	
4 Measure					10.0		10.0	10.0		30.0	
5 Analyze		1.0			1.0		1.0	1.0	1.0	5.0	
											203.4
240 Technical Support											
1 Ecophysiology				25.0	25.0					50.0	
2 Seed transfer study				5.0	3.0	2.0	5.0			15.0	
3 Restored gen trial				5.0	3.0	2.0	5.0			15.0	
4										0.0	
5										0.0	
6										0.0	*80.0*
SUB TOT	0.0	14.4	47.0	95.0	63.0	5.0	21.0	12.0	41.0	*Sub-TOT*	*298.4*
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management										0.0	
											0.0
320 Quality/Quantity Boosts											
1 Grafting for remat replacement			x	x	x	x	x	x	x	0.0	
2 Remat replacement			x	x	x	x	x	x	x	0.0	
3 Rogung			x	x	x	x	x	x	x	0.0	
4 SMP / CP			x	x	x	x	x	x	x	0.0	
5 Induction										0.0	
6 Orchard management/holding beds	x		x	x	x	x	x	x	x	0.0	
											0.0
330 Vegetative Propagation											
1 Rooted cuttings			x	x	x	x	x	x	x	0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control			x	x	x	x	x	x	x	0.0	
2 Disease control										0.0	
3 Monitoring										0.0	
											0.0
350 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4											
5											
6											
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		*0.0*
GRAND TOTALS	**0.0**	**14.4**	**47.0**	**95.0**	**63.0**	**5.0**	**21.0**	**12.0**	**41.0**	**298.4**	**298.4**

6	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 06SsM 20JULY2000

Picea sitchensis - Sitka spruce (M)

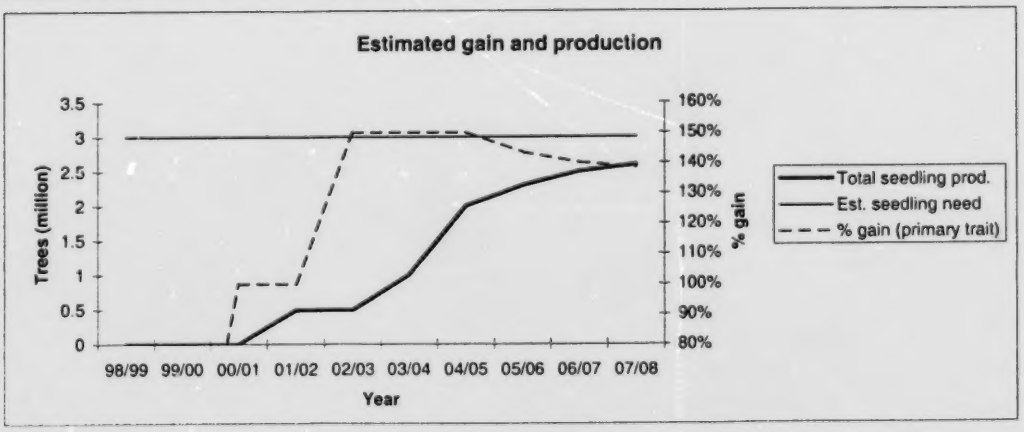
Ss M **0-750 m**

Seedling need (million):	3.0
Program total value rank:	6

Traits for improvement:	
Primary	Weevil Resistance
Secondary	Stem form, Wood quality

	Year (April 1 to March 31)									
	98/99	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
Parents in progeny test:										
Open pollin	300	450	450	450	450	450	450	450	450	450
Polycross										
Clonal	30	250	250	500	500	500	750	750	750	750
F1						300	300	300	300	300
F2									200	200
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
New WFP			0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2
New YPP			0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.4
Vegetative prod.:										
Phase 1	0.0	0.0	0.0	0.5	0.5	1.0	2.0	2.0	2.0	2.0
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
New WFP			100%	100%	100%	100%	100%	100%	100%	100%
New YPP			100%	100%	100%	100%	100%	100%	100%	100%
Vegetative prod.:										
Phase 1	100%	100%	100%	100%	150%	150%	150%	150%	150%	150%
Phase 2										
Total Production	0.0	0.0	0.0	0.5	0.5	1.0	2.0	2.3	2.5	2.6
Total gain	0%	0%	100%	100%	150%	150%	150%	143%	140%	138%

Gain estimates for weevil resistance are being developed through a model that will estimate wood production increase with the use of resistant stock under various hazard ratings. Estimates presented here will change, and reflect estimated increases in the number trees showing resistance to attack.



File: 06SsM 20JULY2000

ORCHARDS

Picea sitchensis - Sitka spruce (M)

6 Ss M **0-750 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Lost Lake	157 Retired								
Lost Lake	142 Retired								
Saanich	172	40	??	160	??				
Yellow Point	144	120	??	579	not licenced				
Yellow Point	New	??	??	519	519	7.2	3,125	1.6	
Puckle Road	New	??	??	?	??				
Saanich	New	??	??	352	352	4.9	3,125	1.1	
								0.0	
		Total ramets		**1,610**	**871**	F15	**Total production**	**2.722**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**2.7** I19

Orchard 172 to be reconfigured
New Yellow Pt & New Saanich to be established with weevil resistant materials.
New Puckle Rd. unknown size and production capacity.

Annual planting	**3.000**	I21
Deficit	**-0.278**	I22 I19-I21
Ramets required	**960**	I23 I21*1,000,000/F27
Ramets required with over-capacity	**1,248**	I24 I23*1.2
Projected necessary expansion	**377**	I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 3,125 F27

Planned over-production capacity = 1.3

Seed weight	387	seeds/g
Seedling recovery factor	0.58	seedlings/seed

Conclusions: Orchard capacity needs to be expanded for resistant materials.

File 06SsM 20JULY2000

ACTIVITIES

Picea sitchensis - Sitka spruce (M)

6 Ss M 0-750 m										Annual planting million		
Program rank 6/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	3.000		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection												
1 Families selected for breeding arboreta		60	x	x						Advanced generation selections made		Number of selections made
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)		400	x	x						Breeding populations established		Number of ramets
2 Mating		400	x	x	x	x	x	x	x	Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design										Strategic and efficient mating and test design		Year design finalized
2 Establish		6	x							Progeny tests establ to design specifications		Number of test sites
3 Maintain		30	x	x	x	x	x	x	x	Progeny test trees free-growing		Number of test sites maintained
4 Measure		6	x		x	x				Sites measured as in strategy		Number of test sites measured
5 Analyze			x		x	x				Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1 Deployment strategy	x	1 report	x	x	x	x	x	x	x	Resistance mechanisms understood		Year of report(s)
2 Resistance mechanisms	x	1 report	x	x	x					Potted orchard for breeding work		Number of ramets
3 Weevil resistance		1 report										
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement			X	X	X	X	X	X	X	Ramets available for replacement		Number of grafts made
2 Ramet replacement			X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets replaced
3 Roguing			X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP			X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets treated
5 Induction										Orchard production		Number of ramets induced
6 Orchard management/holding beds		131	X	X	X	X	X	X	X	Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings			X	X	X	X	X	X	X	High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control		131	X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
3 Monitoring			X	X	X	X	X	X	X	Full orchard production		Number of ramets monitored
350 Technical Support												
1 Accelerated breeding (weevil resist)		1 report								Materials available for veg prop (140 ramets treated)		Report
2 Weevils and resin canals		1 report								Resistant materials identified (40 parents)		Report
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File 06SsM 20JULY2000

BUDGETS

Picea sitchensis - Sitka spruce (M)

6 Ss M 0-750 m	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Prog. Tot Value Rank 6/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta		34.0	10.0	10.0						54.0
										54.0
220 Breed .Arboreta & Mating										
1 Breeding arboreta (ramets)		19.4	15.0	15.0						49.4
2 Mating		15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	120.0
										169.4
230 Progeny testing										
1 Design										0.0
2 Establish		57.0	40.0							97.0
3 Maintain		45.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	325.0
4 Measure		12.0	30.0		30.0	30.0				102.0
5 Analyze			30.0		30.0	30.0				90.0
										614.0
240 Technical Support										
1 Deployment strategy	30.0	40.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	385.0
2 Resistance mechanisms	30.0	25.0	25.0	25.0	25.0					130.0
3 Weevil resistance	27.0	9.0	25.0	20.0	20.0	20.0	15.0	15.0		151.0
4										0.0
5										0.0
6										0.0
										666.0
	87.0	256.4	275.0	170.0	205.0	180.0	115.0	115.0	100.0	*Sub-TOT* *1,503.4*
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement			X	X	X	X	X	X	X	0.0
2 Ramet replacement			X	X	X	X	X	X	X	0.0
3 Rogung			X	X	X	X	X	X	X	0.0
4 SMP / CP			X	X	X	X	X	X	X	0.0
5 Induction										0.0
6 Orchard management/holding beds		1.7	X	X	X	X	X	X	X	1.7
										1.7
330 Vegetative Propagation										
1 Rooted cuttings			X	X	X	X	X	X	X	0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control		1.7	X	X	X	X	X	X	X	1.7
2 Disease control			X	X	X	X	X	X	X	0.0
3 Monitoring			X	X	X	X	X	X	X	0.0
										1.7
350 Technical Support										
1 Accelerated breeding (weevil resist)		15.3								15.3
2 Weevils and resin canals		18.0								18.0
3										
4										
5										
6										
	Past Yr	Current Yr	Next Yr							*33.3*
SUB TOT	0.0	36.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	**87.0**	**293.1**	**275.0**	**170.0**	**205.0**	**180.0**	**115.0**	**115.0**	**100.0**	1,540.1 1,540.1

23	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 23SxSsSM/NST19JULY2000.xls

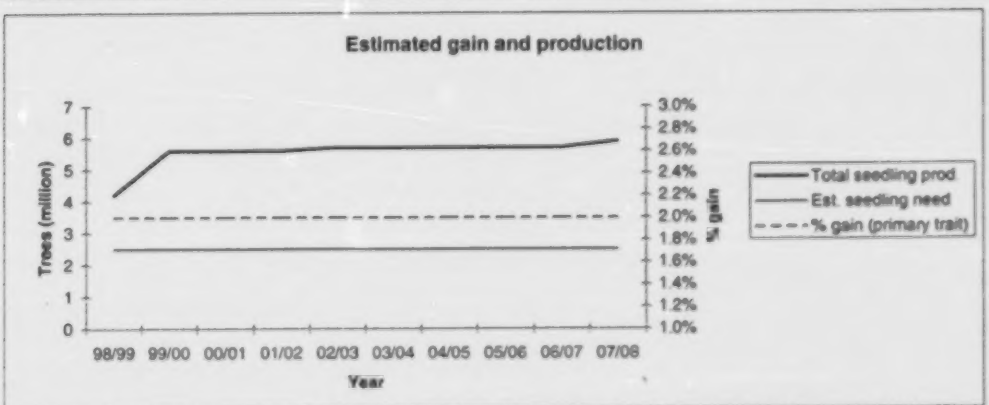
Picea engelmanii x glauca & P. sitchensis - Interior spruce/Sitka spruce)

SxSs SM/NST **all elev.** **transition (SM/NST, all)**

Seedling need (million):	2.5
Program total value rank:	23

Traits for improvement:	
Primary	Stem volume
Secondary	Weevil, frost tolerance

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin		150	450	600	600	600	600	600	600	600
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
131 MoF Cobble Hill	4.2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
178 MoF Cobble Hill	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.3
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
131 MoF Cobble Hill	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
178 MoF Cobble Hill	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	4.2	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.9
Total gain	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 23SxSsSM/NST19JULY2000.xls

ORCHARDS

***Picea engelmanii x glauca & P. sitchensis* - Interior spruce/Sitka spruce transition (SM/NST, all)**

23 SxSs SM/NS **all elev.**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings		
MoF (Cobble Hil	131	92	??	1,440	1,400	26.6	4,000	5.6	I8	
MoF (Cobble Hil	178	30	??	85	85	1.6	4,000	0.3		
								0.0		
								0.0		
								0.0		
								0.0		
								0.0		
								0.0	I15	
		Total ramets		**1,525**	**1,485**	F16	**Total production**	**5.940**	I16	SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**5.9**	I20

Clones in 131 and 178 may not have high weevil resistance.

Annual planting	**2.500**	I22	
Surplus	**3.440**	I23	I20-I22
Ramets required	**625**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**813**	I25	I24*F29
Projected necessary expansion	**0**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F28
Planned over-production capacity = 1.3		F29
Seed weight	383	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: Orchard status to be reviewed based on field trial results in the northern SM

File: 23SxSsSM/NST19JULY2000.xls

ACTIVITIES

Picea engelmanii x glauca & P. sitchensis - Interior spruce/Sitka spruce transition (SM/NST, all)

23 SxSs SM/NST all elev.										Annual planting million		
Prog. Tot Value Rank 23/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	2.500		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made		Number of selections made
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)										Breeding populations established		Number of ramets (1000)
2 Mating										Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design	1									Strategic and efficient mating and test design		Year design finalized
2 Establish		12	3	3						Progeny tests establ. to design specifications		Number of test sites
3 Maintain			6	9	12	12	12	12	12	Progeny test trees free-growing		Number of test sites maintained
4 Measure								6	3	Sites measured as in strategy		Number of test sites measured
5 Analyze								6	3	Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1 Weevil resistance & frost hardiness	1		1	1						Mechanisms understood, guides selection program		Study reports
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement		Number of grafts made
2 Ramet replacement										Genetic gain for primary trait		Number of ramets replaced
3 Roguing										Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP										Genetic gain for primary trait		Number of ramets treated
5 Induction										Orchard production		Number of ramets treated
6 Orchard management/holding beds			X	X	X					Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control										Full orchard production		Number of ramets treated
2 Disease control										Full orchard production		Number of ramets treated
3 Monitoring										Full orchard production		Surveys conducted
350 Technical Support												
1 Marking & reserving seed production stands			X							B+ seed supply assured		Number of Seed Production Areas reserved
2 Enhancing seed production though management			X	X	X					B+ seed supply enhanced		Number of SPA's managed
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File 23SxSsSM/NST19JULY2000.xls

BUDGETS

Picea engelmanii x glauca & P. sitchensis - Interior spruce/Sitka spruce transition (SM/NST, all)

23 SxSs SM/NST	all elev.										
Prog. Tot Value Rank	23/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS		FRBC BUDGETS '000$									TOTALS
210 Selection											0.0
1 Families selected for breeding arboreta											0.0
220 Breed. Arboreta & Mating											0.0
1 Breeding arboreta (ramets)											0.0
2 Mating											0.0
230 Progeny testing		10.0									10.0
1 Design			55.8	18.0	18.0						91.8
2 Establish				10.0	10.0	10.0	10.0	10.0	10.0	10.0	70.0
3 Maintain									60.0	30.0	90.0
4 Measure									0.0	0.0	0.0
5 Analyze											261.8
240 Technical Support		10.0		10.0	10.0						30.0
1 Weevil resistance & frost hardiness											0.0
2											0.0
3											0.0
4											0.0
5											0.0
6											30.0
SUB TOT		20.0	55.8	38.0	38.0	10.0	10.0	10.0	70.0	40.0	*Sub-TOT* 291.8
300 SEED PRODUCTION											
310 Expanded Production											0.0
1 Grafting for new or expanded orchards											0.0
2 New orchards											0.0
3 Orchard expansions											0.0
4 Orchard management											0.0
320 Quality/Quantity Boosts		Decision approx. 2004 regrading orchard status (based on field tests)									0.0
1 Grafting for ramet replacement											0.0
2 Ramet replacement											0.0
3 Pruning											0.0
4 SMP / CP											0.0
5 Induction				X	X	X					0.0
6 Orchard management/rotating tests											0.0
330 Vegetative Propagation											0.0
1 Rooted cuttings											0.0
2 SE											0.0
3 Other											0.0
340 Pest Management											0.0
1 Insect control											0.0
2 Disease control											0.0
3 Monitoring											0.0
350 Technical Support				X							0.0
1 Marking & reserving seed production stands				X	X	X					0.0
2 Enhancing seed production though management											0.0
3											
4											
5											
6		Past Yr	Current Yr	Next Yr							
SUB TOT		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTALS		20.0	55.8	38.0	38.0	10.0	10.0	10.0	70.0	40.0	291.8 291.8

13 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 13LwNElow19JULY2000

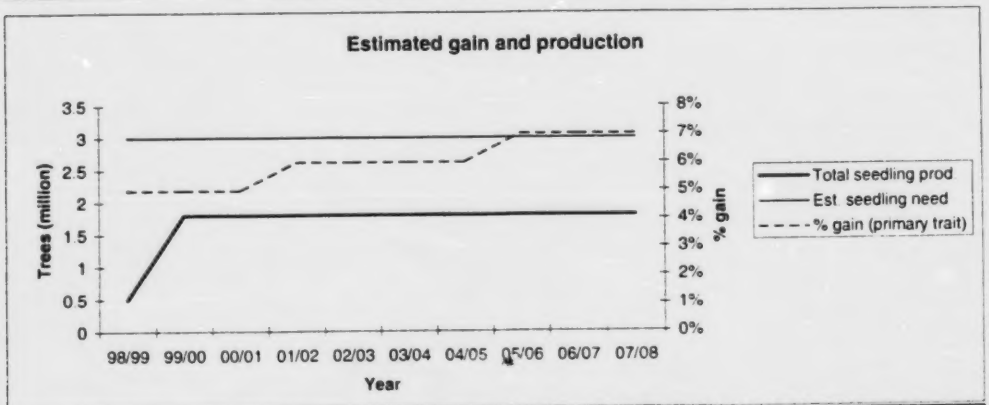
Larix occidentalis - Western Larch (NE, low)

Lw NE low **<1300 m**

Seedling need (million):	3.0
Program total value rank:	13

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	357	357	357	357	357	357	357	357	357	357
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
332 MoF Kal	0.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
332 MoF Kal	5%	5%	5%	6%	6%	6%	6%	7%	7%	7%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total gain	5%	5%	5%	6%	6%	6%	6%	7%	7%	7%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 13LwNElow19JUL2000

ORCHARDS

***Larix occidentalis* - Western Larch (NE, low)**

13 Lw NE low **<1300 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Kal	332	85	5.0%	1,583	1,200	14.3	1,500	**1.8**	
			7% in 2007						
					excludes rogues				
		Total ramets		**1,583**	**1,200**	F15	**Total production**	**1.800**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**1.8** I19

Annual planting	**3.000**	I21	
Deficit	**-1.200**	I22	I19-I21
Ramets required	**2,000**	I23	I21*1,000,000/F27
Ramets required with over-capacity	**2,600**	I24	I23*1.2
Projected necessary expansion	**1,400**		I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,500		F27
Planned over-production capacity = 1.3		
Seed weight	225	seeds/g
Seedling recovery factor	0.56	seedlings/seed ..... This rate borrowed from Fdi - little experience with Lw; estimate may be conservative

Conclusions: Due to a good 1999 crop, and the lack of production information, expansion decisions will be delayed.

File: 13LwNElow19JULY2000

ACTIVITIES

Larix occidentalis - Western Larch (NE, low)

13 Lw NE low <1300 m										Annual planting million		
Prog. Tot Value Rank 13/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	3.000		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**PERFORMANCE INDICATORS**
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made		Number of selections made
220 Breed. Arboreta & Mating												
1 Breeding arboreta (ramets)		100		200		200		200		Breeding populations established		Number of ramets
2 Mating			50	100	100	100				Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design										Strategic and efficient mating and test design		Year design finalized
2 Establish										Progeny tests establ. to design specifications		Number of test sites
3 Maintain			4	4			4		4	Progeny test trees free-growing		Number of test sites maintained
4 Measure			4	4			4		4	Sites measured as in strategy		Number of test sites measured
5 Analyze			4	4			4		4	Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1 Wood density					2					Rankings for density		# sites assessed
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement		173	X	X						Ramets available for replacement		Number of ramets grafted
2 Ramet replacement		73	X	X						Genetic gain for primary trait		Number of ramets replaced
3 Roguing				X	X					Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP		703	X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets treated
5 Induction		484	X	X	X	X	X	X	X	Orchard production		Number of ramets induced
6 Orchard management/holding beds		1,598	X	X	X	X	X	X	X	Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control			X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
3 Monitoring		1,598	X	X	X	X	X	X	X	Full orchard production		Number of ramets monitored
350 Technical Support												
1 Crown management guidelines		1 report								Full orchard production; low cost cone picking		Guidelines for crown management
2												
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File: 13LwNElow19JULY2000 00-Jan-00

BUDGETS

Larix occidentalis - Western Larch (NE, low)

13 Lw NE low <1300 m Prog. Tot Value Rank 13/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$										
210 Selection										0.0	
1 Families selected for breeding arboreta											0.0
220 Breed. Arboreta & Mating		17.5		20.0		20.0		20.0		77.5	
1 Breeding arboreta (ramets)			5.0	5.0	5.0	5.0				20.0	
2 Mating											97.5
230 Progeny testing										0.0	
1 Design										0.0	
2 Establish			40.0	40.0			40.0		40.0	160.0	
3 Maintain			40.0	40.0			40.0		40.0	160.0	
4 Measure			0.0	0.0			0.0		0.0	0.0	
5 Analyze											320.0
240 Technical Support					40.0					40.0	
1 Wood density										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6											40.0
	0.0	17.5	85.0	105.0	45.0	25.0	80.0	20.0	80.0	Sub-TOT	457.5
300 SEED PRODUCTION											
310 Expanded Production										0.0	
1 Grafting for new or expanded orchards										0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management											0.0
320 Quality/Quantity Boosts		1.8	X	X						1.8	
1 Grafting for ramet replacement		1.8	X	X						1.8	
2 Ramet replacement		0.0		X	X					0.0	
3 Rogueing		1.8	X	X	X	X	X	X	X	1.8	
4 SMP / CP		1.8	X	X	X	X	X	X	X	1.8	
5 Induction		1.8	X	X	X	X	X	X	X	1.8	
6 Orchard management/holding beds											9.2
330 Vegetative Propagation		0.0								0.0	
1 Rooted cuttings		0.0								0.0	
2 SE		0.0								0.0	
3 Other											0.0
340 Pest Management		0.0	X	X	X	X	X	X	X	0.0	
1 Insect control		0.0	X	X	X	X	X	X	X	0.0	
2 Disease control		0.4	X	X	X	X	X	X	X	0.4	
3 Monitoring											0.4
350 Technical Support		3.5								3.5	
1 Crown management guidelines										0.0	
2										0.0	
3											
4											
5	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		3.5
GRAND TOTALS	0.0	30.6	85.0	105.0	45.0	25.0	80.0	20.0	80.0	470.6	470.6

34	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 34LwEK25JULY2000

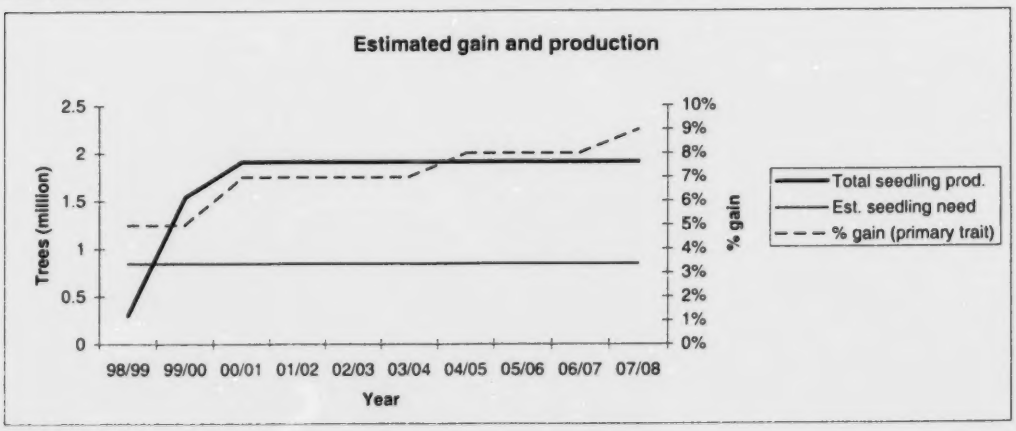
***Larix occidentalis* - Western Larch (EK)**

Lw EK **800-1500 m**

Seedling need (million):	0.8
Program total value rank:	34

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
Parents in progeny test:										
Open pollin	250	250	250	250	250	250	250	250	250	250
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
333 MoF Kal	0.3	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
333 MoF Kal	5%	5%	7%	7%	7%	7%	8%	8%	8%	9%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.3	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Total gain	5%	5%	7%	7%	7%	7%	8%	8%	8%	9%



File: 34LwEK25JULY2000

ORCHARDS

***Larix occidentalis* - Western Larch (EK)**

34 Lw EK **800-1500 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Kal	333	85	5%	2,504	1,270	15.1	1,500	**1.9**	I8
			9% in 2007						
					excludes rogues				
								0.0	I15
		Total ramets		**2,504**	**1,270**	F16	**Total production**	**1.905**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**1.9**	I20 I16+I18+I20

Annual planting	**0.845**	I22	
Surplus	**1.060**	I23	I20-I22
Ramets required	**563**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**732**	I25	I24*F29
Projected necessary expansion	**0**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	**1,500**	F28
Planned over-production capacity =	**1.3**	F29
Seed weight	225	seeds/g
Seedling recovery factor	0.56	seedlings/seed

This rate borrowed from Fdi - little experience with Lw

Conclusions: Projected surplus; opportunities to rogue for gain.

File 34LwEK25JULY2000

ACTIVITIES

Larix occidentalis - Western Larch (EK)

34 Lw EK 800-1500 m Prog. Tot Value Rank 34/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 0.845	
200 BREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS	KPI DESCRIPTION
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets
2 Mating			50	100	100	100				Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish								2	2	Progeny tests establ. to design specifications	Number of test sites
3 Maintain		8				4	4			Progeny test trees free-growing	Number of test sites maintained
4 Measure		8				4	4			Sites measured as in strategy	Number of test sites measured
5 Analyze						4	4			Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Wood density						2				Rankings for density	Two sites
2										Materials avail for breeding and orchards	One clone bank maintained
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		68	X	X						Ramets available for replacement	Number of grafts made
2 Ramet replacement		27	X	X						Genetic gain for primary trait	Number of ramets replaced
3 Roguing			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets treated
5 Induction			X	X	X	X	X	X	X	Orchard production	Number of ramets induced
6 Orchard management/holding beds		2,431	X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring		2,431	X	X	X	X	X	X	X	Full orchard production	Number of ramets surveyedtreated
350 Technical Support											
1											
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File 34LwEK25JULY2000

BUDGETS

Larix occidentalis - Western Larch (EK)

34 Lw EK 800-1500 m										
Prog. Tot Value Rank 34/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										0.0
1 Families selected for breeding arboreta										*0.0*
220 Breed. Arboreta & Mating										0.0
1 Breeding arboreta (remote)			5.0	5.0	5.0	5.0				20.0
2 Mating										*20.0*
230 Progeny testing										0.0
1 Design								25.0	25.0	50.0
2 Establish		42.0				40.0	40.0			122.0
3 Maintain		39.0				40.0	40.0			119.0
4 Measure						0.0	0.0			0.0
5 Analyze										*291.0*
240 Technical Support						40.0				40.0
1 Wkard density										0.0
2										0.0
3										0.0
4										0.0
5										0.0
6										*40.0*
	0.0	81.0	5.0	5.0	5.0	125.0	80.0	25.0	25.0	*Sub-TOT* *351.0*
300 SEED PRODUCTION										
310 Expanded Production										0.0
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										*0.0*
320 Quality/Quantity Boosts		1.5	X	X						1.5
1 Grafting for ramet replacement		1.5	X	X						1.5
2 Ramet replacement			X	X	X	X	X	X	X	0.0
3 Rogueing			X	X	X	X	X	X	X	0.0
4 SMP / CP			X	X	X	X	X	X	X	0.0
5 Induction			X	X	X	X	X	X	X	0.0
6 Orchard management/training trees		1.5	X	X	X	X	X	X	X	1.5
										4.4
330 Vegetative Propagation										0.0
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										*0.0*
340 Pest Management			X	X	X	X	X	X	X	0.0
1 Insect control			X	X	X	X	X	X	X	0.0
2 Disease control			X	X	X	X	X	X	X	1.5
3 Monitoring		1.5								*1.5*
350 Technical Support										
1										
2										
3										
4										
5										
6										*0.0*
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	0.0	86.9	5.0	5.0	5.0	125.0	80.0	25.0	25.0	356.9 356.9

8	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 08PwCst 20July2000

Pinus monticola - Western White Pine (Coast)

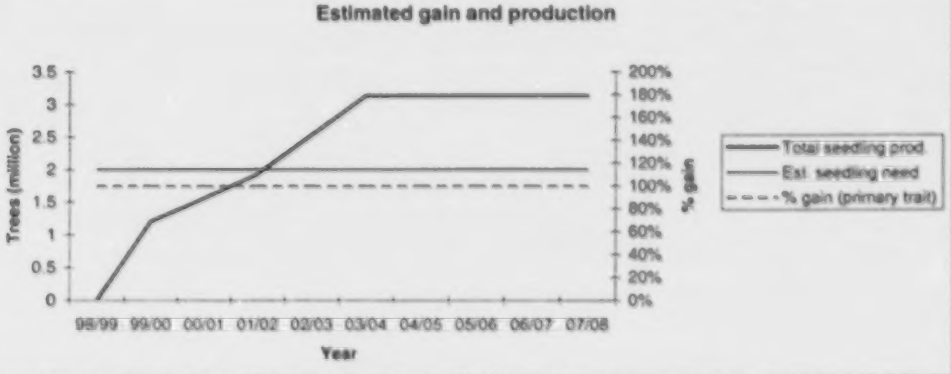
Pw Cst. 0-1000 m

Seedling need (million):	2.0
Program total value rank:	8

Traits for improvement:	
Primary	Rust resistance
Secondary	Stem form, wood properties

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polln										
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
174 Canlor	0.0	0.5	0.7	0.8	1.1	1.4	1.4	1.4	1.4	1.4
175 MoF (Puckle Rd)	0.0	0.3	0.4	0.5	0.7	0.9	0.9	0.9	0.9	0.9
403 TW	0.0	0.3	0.4	0.6	0.7	0.9	0.9	0.9	0.9	0.9
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
174 Canlor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
175 MoF (Puckle Rd)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
403 TW	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	1.2	1.6	1.9	2.5	3.1	3.1	3.1	3.1	3.1
Total gain	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

These gain figures are arbitrary: actual gain in resistance will depend on results of resistance screening an on estimations methodology being developed



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File 08PwCst 20July2000

ORCHARDS

Pinus monticola - Western White Pine (Coast)

8 Pw Cst. 0-1000 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Sechelt	174	50	none	800	800	46.5	1,700	1.4	
Puckle Rd	175	67	none	519	519	19.0	1,700	0.9	
Mt Newton	403	53+	none	523	523	19.1	1,700	0.9	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
		Total ramets		**1,842**	**1,842**	F15	**Total production**	**3.131**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**3.1** I19

Current orchard capacity will have to reviewed as rust susceptible clones are removed. New resistant ramets may be added to existing orchards. Progress in identifying resistant clones may require major orchard reconfiguration or new orchard development.

Seedling production per ramet and seedling recovery factors may both be over-optimistic.

Annual planting	**2.000**	I21
Surplus	**1.131**	I22 I19-I21
Ramets required	**1,176**	I23 I21*1,000,000/F27
Ramets required with over-capacity	**1,529**	I24 I23*1.2
Projected necessary expansion	**0**	I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,700		F27
Planned over-production capacity = 1.3		
Seed weight	45	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Current capacity will likely meet future demand: however, resistance screening may engender future ramet replacements.

File: 08PwCst 20July2000

ACTIVITIES

Pinus monticola - Western White Pine (Coast)

8 Pw Cst. 0-1000 m										Annual planting million		
Program rank: 8/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	2.000		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection												
1 Families selected for breeding arboreta		48	48	48	48	48	48	48	48	Advanced generation selections made		Number of selections made
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)		200		12	12	12	12	12	12	Breeding populations established		Number of ramets (1000)
2 Mating		400	240	240	180					Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design	99/00									Strategic and efficient mating and test design		Year design finalized
2 Establish		4	1		1		1			Progeny tests establ. to design specifications		Number of test sites
3 Maintain		20	36	42	42	48	36	42	42	Progeny test trees free-growing		Number of test sites maintained
4 Measure		12		8		8		8		Sites measured as in strategy		Number of test sites measured
5 Analyze		3		6		6		6		Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1 Resistance screening			120	120		120	120		120	Innoculations of FS seedlings with field testing		Numbers of FS families screened
2 Molecular analysis of MGR mechanisms		1	1							Identification of MGR hypersensitivity mechanisms		Report
3 SE as an adjunct to breeding		1	1							Protocol for vegetative prop of rust resist stock		Report
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement		1,820	X	X	X	X				Ramets available for replacement		Number of grafts made
2 Ramet replacement		1,500	X	X	X	X	X			Genetic gain for primary trait		Number of ramets replaced
3 Roguing										Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP		1,100	X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets treated
5 Induction			X	X	X	X	X	X	X	Orchard production		Number of ramets induced
6 Orchard management/holding beds		1,459	X	X	X	X	X	X	X	Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control			X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
2 Disease control		300	X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
3 Monitoring			X	X	X	X	X	X	X	Full orchard production		Surveys conducted
350 Technical Support												
1 MGR fingerprinting		1								Improved rust resistance		Report
2 Cone induction protocol		1								Earlier first flowering, shortened breeding time		Report
3 Flag to extension program (urgent)												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File 08PwCst 20July2000

BUDGETS

Pinus monticola - Western White Pine (Coast)

8 Pw Cst. 0-1000 m Prog. Tot Value Rank 8/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$										
210 Selection											
1 Families selected for breeding arboreta		8.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	176.0	176.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (cones)		14.5		24.0	24.0	24.0	24.0	24.0	24.0	158.5	
2 Mating		34.0	36.0	36.0	36.0					142.0	300.5
230 Progeny testing											
1 Design	0.0									0.0	
2 Establish		34.0	72.0		72.0		72.0			250.0	
3 Maintain	90.0	70.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	790.0	
4 Measure		34.0		36.0		36.0		36.0		142.0	
5 Analyze		6.0		24.0		24.0		24.0		78.0	1,260.0
240 Technical Support											
1 Resistance screening		62.0	30.0	30.0		30.0	30.0		30.0	232.0	
2 Molecular analyses of MGR mechanisms		10.0	30.0							40.0	
3 SE as an adjunct to breeding			10.0							10.0	
4										0.0	
5										0.0	
6										0.0	282.0
	90.0	262.5	292.0	264.0	246.0	228.0	240.0	198.0	168.0	*Sub-TOT*	2,018.5
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management										0.0	0.0
320 Quality/Quantity Boost											
1 Grafting for ramet replacement		7.2	x	x	x	x				7.2	
2 Ramet replacement		4.0	x	x	x	x	x			4.0	
3 Rogging										0.0	
4 SMP / CP		14.4	x	x	x	x	x	x	x	14.4	
5 Induction										0.0	
6 Orchard management/rotating tests		7.2	x	x	x	x	x	x	x	7.2	33.7
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	0.0
340 Pest Management											
1 Insect control			x	x						0.0	
2 Disease control		4.2	x	x						4.2	
3 Monitoring			x	x						0.0	4.2
350 Technical Support											
1 MGR fingerprinting		30.9								30.9	
2 Cone induction protocol		31.0								31.0	
3 Flag to extension program (urgent)										0.0	
4											
5											
6											61.9
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	98.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	90.0	391.3	292.0	264.0	246.0	228.0	240.0	198.0	168.0	2,117.3	2,117.3

15	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 15PwS Int 24JULY2000

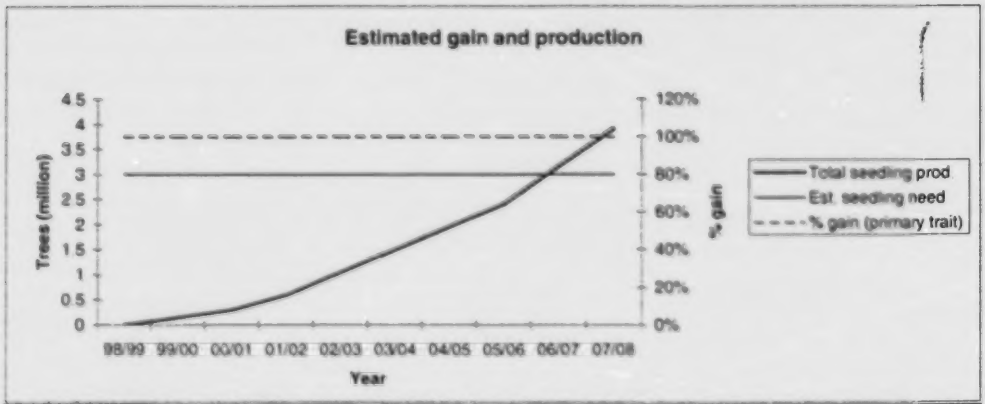
Pinus monticola - Western White Pine (S.Interior)

Pw S. Int. **<1400 m**

Seedling need (million):	3.0
Program total value rank:	15

Traits for improvement:	
Primary	Rust resistance
Secondary	Stem volume

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin										
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
335 MoF Kal (Bailey)	0.0	0.2	0.3	0.8	1.1	1.5	2.0	2.4	3.2	3.9
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
335 MoF Kal (Bailey)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.2	0.3	0.8	1.1	1.5	2.0	2.4	3.2	3.9
Total gain	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 15PwS Int 24JULY2000

ORCHARDS

***Pinus monticola* - Western White Pine (S.Interior)**

15 Pw S. Int. **<1400 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Kal	335	136	??	2,393	2,300	133.7	1,700	**3.9**	I8
									I15
		Total ramets		**2,393**	**2,300**	F16	**Total production**	**3.910**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**3.9**	I20 I16+I18+I20

Annual planting	**3.000**	I22	
Surplus	**0.910**	I23	I20-I22
Ramets required	**1,765**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**2,294**	I25	I24*F29
Projected necessary expansion	**0**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	**1,700**	F28	This production rate is uncertain.
Planned over-production capacity =	**1.3**	F29	
Seed weight	45	seeds/g	
Seedling recovery factor	0.65	seedlgs/seed	This recovery rate may be too high.

Conclusions: Projected surplus. Little production info.

File: 15PwS.Int.24JULY2000

ACTIVITIES

Pinus monticola - Western White Pine (S.Interior)

15 Pw S. Int. <1400 m										Annual planting million	
Prog. Tot Value Rank 15/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	3.000	
200 BREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS	PERFORMANCE INDICATORS
210 Selection											
1 Families selected for breeding arboreta	8		16	16	16	16	16	16	16	Advanced generation selections made	Number of selections made
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)	4		6	6	6	6	6	6	6	Breeding populations established	Number of ramets
2 Mating	40		80	80	80	60	40	30	30	Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design			1		1		1			Strategic and efficient mating and test design	Year design finalized
2 Establish										Progeny tests establ. to design specifications	Number of test sites
3 Maintain		4		13	13	14	14	15	15	Progeny test trees free-growing	Number of test sites maintained
4 Measure				12		13		14		Sites measured as in strategy	Number of test sites measured
5 Analyze				12		13		14		Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Resistance screening			40	40		40	40			Inoculations of FS seedlings with field testing	Number of FS families screened
2											
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		0					X	X	X	Ramets available for replacement	Number of grafts made
2 Ramet replacement		95	X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets replaced
3 Rogung		0	X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP		1,981	X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets treated
5 Induction		100	X	X	X	X	X	X	X	Orchard production	Number of ramets induced
6 Orchard management/holding beds		3,235	X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings		0								High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE		0								High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other		0								High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control		2,822	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control		0	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring		2,822	X	X	X	X	X	X	X	Full orchard production	Number of ramets monitored
350 Technical Support											
1 Pheromone mating disruption in cone borer		1 report								Higher seed yields (reduced losses to cone borer)	Protocol for pheromone mating disruption
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File: 15PwS Int.24JULY2000 00-Jan-00

BUDGETS

Pinus monticola - Western White Pine (S.Interior)

15 Pw S. Int. <1400 m										
Prog. Tot Value Rank 15/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	40.0
										40.0
220 Breed. Arboreta & Mating										
1 Breeding arboreta (remeta)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 Mating	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	40.0
										40.0
230 Progeny testing										
1 Design										0.0
2 Establish			10.0		10.0		10.0			30.0
3 Maintain		5.7		5.0	5.0	5.0	5.0	5.0	5.0	35.7
4 Measure				10.0		10.0		10.0		30.0
5 Analyze				0.0		0.0		0.0		0.0
										96.7
240 Technical Support										
1 Resistance screening			30.0	30.0		30.0	30.0			120.0
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0 *120.0*
	10.0	5.7	50.0	55.0	25.0	55.0	55.0	25.0	15.0	*Sub-TOT* *295.7*
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement							X	X	X	0.0
2 Ramet replacement		2.2	X	X	X	X	X	X	X	2.2
3 Roguing			X	X	X	X	X	X	X	0.0
4 GMP / CP		3.0	X	X	X	X	X	X	X	3.0
5 Induction		0.9	X	X	X	X	X	X	X	0.9
6 Orchard management/holding beds		3.0	X	X	X	X	X	X	X	3.0
										9.1
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control		3.0	X	X	X	X	X	X	X	3.0
2 Disease control			X	X	X	X	X	X	X	0.0
3 Monitoring		3.0	X	X	X	X	X	X	X	3.0
										6.1
350 Technical Support										
1 Pheromone mating disruption in cone borer		4.5								4.5
2										
3										
4										
5										
6										*4.5*
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	**10.0**	**25.4**	**50.0**	**55.0**	**25.0**	**55.0**	**55.0**	**25.0**	**15.0**	**315.4** **315.4**

7	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 07PliNElow 20JULY2000

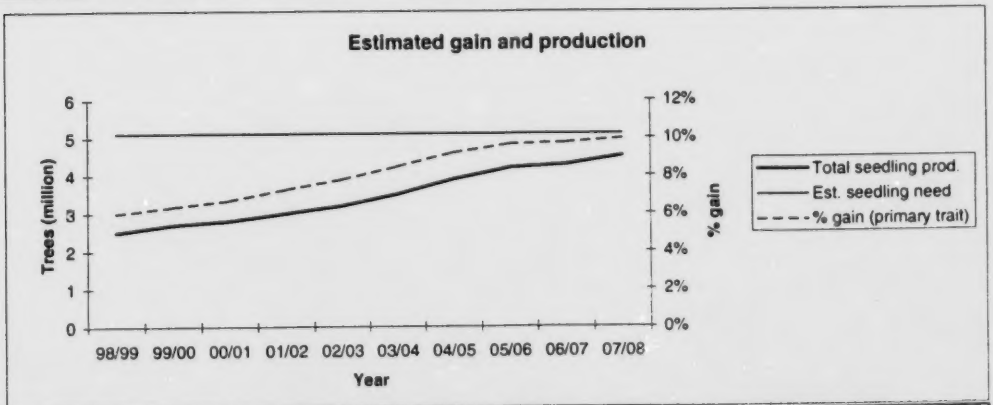
Pinus contorta - Interior Lodgepole Pine (NE, low)

Pli NE low **<1400 m**

Seedling need (million):	5.1
Program total value rank:	7

Traits for improvement:	
Primary:	Stem volume
Secondary:	Wood density

	Year (April 1 to March 31)									
	98/99	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
Parents in progeny test:										
Open pollin.	286	286	286	286	286	286	286	286	286	286
Polycross										
Clonal										
F1						150	150	150	150	150
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
307 MoF (Kal)	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
313 PRT	0.0	0.1	0.2	0.4	0.6	0.9	1.3	1.6	1.6	1.6
GenSeed expansion				0.0	0.0	0.0	0.0	0.0	0.1	0.3
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
307 MoF (Kal)	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
313 PRT	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%
GenSeed expansion				14%	14%	14%	14%	14%	14%	14%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	2.5	2.7	2.8	3.0	3.2	3.5	3.9	4.2	4.3	4.5
Total gain	6%	6%	7%	7%	8%	8%	9%	10%	10%	10%


Estimated gain and production
Trees (million)
% gain
Year
98/99 99/00 00/01 01/02 02/03 03/04 04/05 05/06 06/07 07/08
0 1 2 3 4 5 6
0% 2% 4% 6% 8% 10% 12%
Total seedling prod.
Est. seedling need
% gain (primary trait)

Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 07PliNElow 20JULY2000

ORCHARDS

Pinus contorta - Interior Lodgepole Pine (NE, low)

7 Pli NE low **<1400 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Kal	307	54	6.0%	1,762	1,762	16.0	1,500	**2.6**	307 KAL has BV 6% or less
PRT	313	40	15.6%	1,086	1,086	9.9	1,500	**1.6**	313 PRT has 1,086 ramets and
								0.0	will add 2,000 ramets in 2000
								0.0	Check with Mike Carlson re
								0.0	Status of this expansion
								0.0	
								0.0	
								0.0	
		Total ramets		**2,848**	**2,848**	F15	**Total production**	**4.272**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**4.3** I19

Even with a planned 2,000 ramet expansion in 00/01, we will still be relying on orchard 307 for a portion of the annual production.

Annual planting	**5.108**	I21
Deficit	**-0.836**	I22 I19-I21
Ramets required	**3,405**	I23 I21*1,000,000/F27
Ramets required with over-capacity	**4,427**	I24 I23*1 2
Projected necessary expansion	**1,579**	I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,500		F27
Planned over-production capacity = 1.3		
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Currently planned expansions are expected to meet long-term demand.

File 07PliNElow 20JULY2000

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (NE, low)

7 PII NE low <1400 m	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Annual planting million		
Prog. Tot Value Rank 7/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	5.108		
200 BREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS		KPI DESCRIPTION
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made		Number of selections made
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)	30	65	30							Breeding populations established		Number of ramets
2 Mating										Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design			2001							Strategic and efficient mating and test design		Year design finalized
2 Establish				3						Progeny tests establ. to design specifications		Number of test sites
3 Maintain						3				Progeny test trees free-growing		Number of test sites maintained
4 Measure										Sites measured as in strategy		Number of test sites measured
5 Analyze										Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1 Wood testing		1 report								Wood property rankings		Report completion
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards		1,120								Full production capacity		Number of grafts made
2 New orchards				x	x					Full production capacity		Number of ramets established
3 Orchard expansions						x	x	x	x	Full production capacity		Number of ramets established
4 Orchard management					x					Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement		Number of grafts made
2 Ramet replacement										Genetic gain for primary trait		Number of ramets replaced
3 Roguing										Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP		1,916								Genetic gain for primary trait		Number of ramets treated
5 Induction										Orchard production		Number of ramets induced
6 Orchard management/holding beds		1,866								Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control		1758								Full orchard production		Number of ramets treated
2 Disease control										Full orchard production		Number of ramets treated
3 Monitoring										Full orchard production		Number of ramets monitored
350 Technical Support												
1												
2 Irrigation and misting (307 KAL) 0705		1 report								Improved seed set		Report
3 Mating disruption in pitch moths 0707		1 report								Improved seed yield		Report
4 Efficacy of SMP (228, 307, 311) 0708		1 report								Improved seed yield and seedlot genetic worth		Report
5 Background pollen assessments 0709		1 report								Improved seed set		Report
6 Strategies to improve seed set 0711		1 report								Enhanced seed production		Report
7 Nelson timber supply analy		1 report								Understanding timber supply implications		Report
8	Past Yr	Current Yr	Next Yr									

File 07PliNElow 20JULY2000

BUDGETS

Pinus contorta - Interior Lodgepole Pine (NE, low)

7 Pli NE low <1400 m Prog. Tot Value Rank 7/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
› Families selected for breeding arboreta										0.0	0.0
220 Breed Arboreta & Mating											
› Breeding arboreta (romete)										0.0	
› Mating	10.0	26.0	10.0							46.0	46.0
230 Progeny testing											
› Design			0.0							0.0	
› Establish				15.0	30.0					45.0	
› Maintain						10.0	10.0	10.0	10.0	40.0	
› Measure									20.0	20.0	
› Analyze										0.0	105.0
240 Technical Support											
› Wood testing		11.4								11.4	
›										0.0	
›										0.0	
›										0.0	
›										0.0	
›										0.0	11.4
	10.0	37.4	10.0	15.0	30.0	10.0	10.0	10.0	30.0	Sub-TOT	162.4
300 SEED PRODUCTION											
310 Expanded Production											
› Grafting for new or expanded orchards										0.0	
› New orchards										0.0	
› Orchard expansions										0.0	
› Orchard management										0.0	0.0
320 Quality/Quantity Boosts											
› Grafting for ramet replacement										0.0	
› Ramet replacement										0.0	
› Rogging										0.0	
› SMP / CP		10.8								10.8	
› Induction										0.0	
› Orchard management/rubbing beds		4.2								4.2	14.9
330 Vegetative Propegation											
› Rooted cuttings										0.0	
› SE										0.0	
› Other										0.0	0.0
340 Pest Management											
› Insect control		4.2								4.2	
› Disease control										0.0	
› Monitoring										0.0	4.2
350 Technical Support											
›										0.0	
› Irrigation and misting (307 KAL)		8.0								8.0	
› Mating disruption in pitch moths		8.9								8.9	
› Efficacy of SMP (228, 307, 311)		18.8								18.8	
› Background pollen assessments		2.5								2.5	
› Strategies to improve seed out		101.0								101.0	
› Nelson timber supply study		5.0								5.0	
›										0.0	
	Past Yr	Current Yr	Next Yr								144.1
SUB TOT	0.0	163.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	10.0	200.7	10.0	15.0	30.0	10.0	10.0	10.0	30.0	325.7	325.7

10	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 10PliTOlow24JULY2000

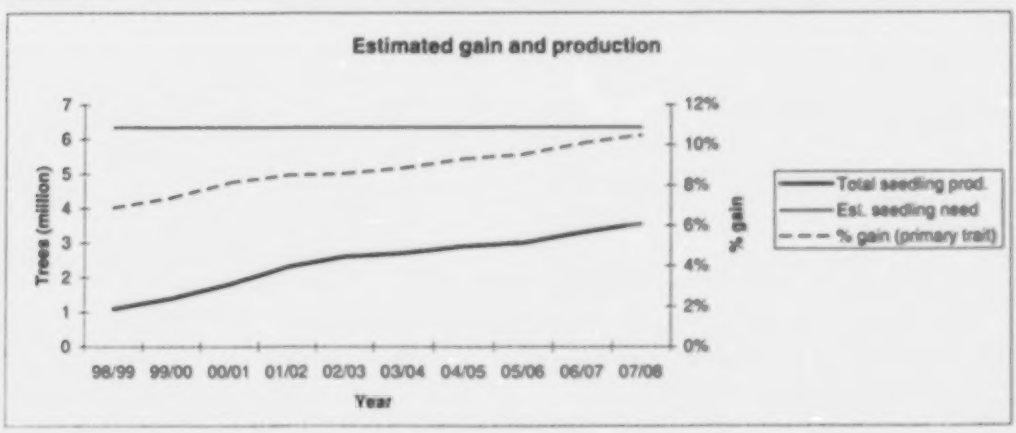
Pinus contorta - Interior Lodgepole Pine (TO, low)

Pli TO low **<1400 m**

Seedling need (million):	6.3
Program total value rank:	10

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin	445	445	445	445	445	445	445	445	445	445
Polycross										
Clonal										
F1							130	130	130	130
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
308 PRT	1.0	1.2	1.4	1.7	1.9	1.9	1.9	1.9	1.9	1.9
311 PRT	0.1	0.2	0.4	0.6	0.7	0.8	1.0	1.1	1.4	1.5
GenSeed expansion				0.0	0.0	0.0	0.0	0.0	0.0	0.2
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
308 PRT	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
311 PRT	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%
GenSeed expansion				16%	16%	16%	16%	16%	16%	16%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	1.1	1.4	1.8	2.3	2.6	2.7	2.9	3.0	3.3	3.6
Total gain	7%	7%	8%	9%	9%	9%	9%	10%	10%	10%


Estimated gain and production
Trees (million)
% gain
Year
98/99 99/00 00/01 01/02 02/03 03/04 04/05 05/06 06/07 07/08
0 1 2 3 4 5 6 7
0% 2% 4% 6% 8% 10% 12%
Total seedling prod.
Est. seedling need
% gain (primary trait)

File: 10PliTOlow24JULY2000

ORCHARDS

Pinus contorta - Interior Lodgepole Pine (TO, low)

10 Pli TO low **<1400 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
PRT	308	40	6.0%	1,247	1,247	11.3	1,500	1.9	
PRT	311	69	15.7%	1,024	1,024	9.3	1,500	1.5	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
		Total ramets		**2,271**	**2,271**	F15	**Total production**	**3.407**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I17
	Total production	**3.4**	I19

Annual planting	**6.346**	I21	
Deficit	**-2.940**	I22	I19-I21
Ramets required	**4,231**	I23	I21*1,000,000/F27
Ramets required with over-capacity	**5,500**	I24	I23*1.2
Projected necessary expansion	**3,229**		I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,500		F27
Planned over-production capacity = 1.3		
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Projected deficit requires expansion.

File: 10PliTOlow24JULY2000

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (TO, low)

10 Pli TO low <1400 m										Annual planting million		
Prog. Tot Value Rank 10/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	6.346		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**	
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made	
220 Breed. Arboreta & Mating												
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets (1000)	
2 Mating		35	60	60						Breeding strategy crosses made on time	Number of crosses	
230 Progeny testing												
1 Design					1 series					Strategic and efficient mating and test design	Year design finalized	
2 Establish						3 sites, 130 fams				Progeny tests establ. to design specifications	Number of test sites	
3 Maintain										Progeny test trees free-growing	Number of test sites maintained	
4 Measure										Sites measured as in strategy	Number of test sites measured	
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed	
240 Technical Support												
1 Realized Gain trial		6								RG trials guide breeding plans	Sites established and maintained	
2 Wood testing		1			Measure					Wood property rankings	Report	
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards		1,005	X	X						Full production capacity	Number of grafts made	
2 New orchards				X	X					Full production capacity	Number of ramets established	
3 Orchard expansions				X	X					Full production capacity	Number of ramets established	
4 Orchard management				X	X	X	X	X	X	Productive orchard (higher GW seedlots)	Number of ramets maintained	
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement			X	X	X	X	X	X	X	Ramets available for replacement	Number of grafts made	
2 Ramet replacement			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets replaced	
3 Rogung			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets rogued	
4 SMP / CP		5,566	X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets treated	
5 Induction			X	X	X	X	X	X	X	Orchard production	Number of ramets induced	
6 Orchard management/holding beds			X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained	
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced	
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced	
3 Other										High genetic worth materials bulked up	Numbers of propagules produced	
340 Pest Management												
1 Insect control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated	
3 Monitoring			X	X	X	X	X	X	X	Full orchard production	Number of ramets monitored	
350 Technical Support												
1 Seed production in Pli		1								Full orchard production	Report	
2 GW evaluations in Pli seedlots		1								GW evaluation protocol	Report	
3 SMP protocol development			X	X						Effective SMP (higher filled seed & GW)	Report	
4 Pollen research			X	X						Effective pollen management	Report	
5 Orchard seed-set			X	X						High filled seed production	Report	
6 Seed & cone insect control techniques			X	X						High seed production	Report	
	Past Yr	Current Yr	Next Yr									

File: 10PliTOlow24JULY2000

BUDGETS

Pinus contorta - Interior Lodgepole Pine (TO, low)

10 Pli TO low <1400 m										
Prog. Tot Value Rank: 10/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	**FRBC BUDGETS '000S**									**TOTALS**
210 Selection										
1 Families selected for breeding arboreta										0.0
										0.0
220 Breed Arboreta & Mating										
1 Breeding arboreta (remote)										0.0
2 Mating		11.6	30.0	25.0						66.6
										66.6
230 Progeny testing										
1 Design					0.0					0.0
2 Establish						15.0	30.0	10.0	10.0	65.0
3 Maintain										0.0
4 Measure										0.0
5 Analyze										0.0
										65.0
240 Technical Support										
1 Realized Gain trial		30.0								30.0
2 Wood testing	30.0	14.0	10.0	10.0	20.0	6.0	6.0	6.0	6.0	108.0
3 0										0.0
4										0.0
5										0.0
6										0.0
										138.0
	30.0	55.6	40.0	35.0	20.0	21.0	36.0	16.0	16.0	*Sub-TOT* 269.6
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement			X	X	X	X	X	X	X	0.0
2 Ramet replacement			X	X	X	X	X	X	X	0.0
3 Roguing			X	X	X	X	X	X	X	0.0
4 GMP / CP		0.1	X	X	X	X	X	X	X	0.1
5 Induction			X	X	X	X	X	X	X	0.0
6 Orchard management/holding beds										0.0
										0.1
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control			X	X	X	X	X	X	X	0.0
2 Disease control			X	X	X	X	X	X	X	0.0
3 Monitoring			X	X	X	X	X	X	X	0.0
										0.0
350 Technical Support										
1 Seed production in Pli		151.0	X							151.0
2 GW evaluations in Pli seedlots		25.6	X							25.6
3 GMP protocol development			X							0.0
4 Pollen research			X							
5										
6										
	Past Yr	Current Yr	Next Yr							176.6
SUB TOT	0.0	188.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	30.0	241.3	40.0	35.0	20.0	21.0	36.0	16.0	16.0	455.3 269.6

12	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 12PliPGlow24JULY2000

Pinus contorta - Interior Lodgepole Pine (PG, low)

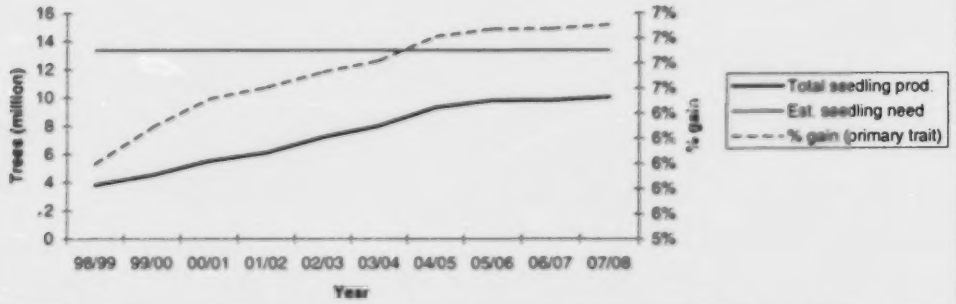
Pli PG low **<1100 m**

Seedling need (million):	13.4
Program total value rank:	12

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin	303	303	303	303	303	303	303	303	303	303
Polycross										
Clonal										
F1				150	150	150	150	150	150	150
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
203 MoF (PGTIS)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
220 MoF (PGTIS)	1.0	1.1	1.4	1.6	2.0	2.2	2.2	2.2	2.2	2.2
222 VSOC	1.8	2.4	3.1	3.5	4.2	4.8	6.1	6.6	6.6	6.6
GenSeed expansion					0.0	0.0	0.0	0.0	0.0	0.3
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
203 MoF (PGTIS)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
220 MoF (PGTIS)	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
222 VSOC	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
GenSeed expansion					9%	9%	9%	9%	9%	9%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	3.8	4.5	5.5	6.1	7.2	8.0	9.3	9.8	9.8	10.1
Total gain	6%	6%	7%	7%	7%	7%	7%	7%	7%	7%

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 12PliPGlow24JULY2000

ORCHARDS

Pinus contorta - Interior Lodgepole Pine (PG, low)

12 Pli PG low **<1100 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod million seedlings	
PGTIS	203	110	2%	787	670	6.1	1,500	**1.0**	
PGTIS	220	40	6%	1,440	1,437	13.1	1,500	**2.2**	
VSOC	222	56	8%	4,389	4,389	39.9	1,500	**6.6**	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
		Total ramets		**6,616**	**6,496**	F15	**Total production**	**9.744**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**9.7** I19

Annual planting	**13.353**	I21
Deficit	**-3.609**	I22 I19-I21
Ramets required	**8,902**	I23 I21*1,000,000/F27
Ramets required with over-capacity	**11,573**	I24 I23*1.2
Projected necessary expansion	**5,077**	I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	**1,500**	F27
Planned over-production capacity =	**1.3**	
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Projected deficit requires expansion.

File: 12PliPGlow24JULY2000

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (PG, low)

12 Pli PG low <1100 m										Annual planting million	
Prog. Tot Value Rank 12/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	13.353	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed: Arboreta & Mating											
1 Breeding arboreta (ramets)	50									Breeding populations established	Number of ramets
2 Mating										Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish			3							Progeny tests establ. to design specifications	Number of test sites
3 Maintain				3	3	3	3			Progeny test trees free-growing	Number of test sites maintained
4 Measure							3			Sites measured as in strategy	Number of test sites measured
5 Analyze							3			Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Realized Gain trial		M6	M6	M6	M6	ME6	M6	M6	M6	RG trials guide breeding plans	Sites established, maintained, measured
2 Intra / Inter Provenance crossing trial			Report							Guidelines on inter prov crossing	Report and guidelines
3 Wood testing										Rankings for wood quality	Report and list of wood properties
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards		2,770	X	X						Full production capacity	Number of grafts made
2 New orchards				X	X					Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management					X	X	X	X	X	Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		293								Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Roguing										Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP		5,640	X	X						Genetic gain for primary trait	Number of ramets treated
5 Induction										Orchard production	Number of ramets induced
6 Orchard management/holding beds		901	X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control		4,389	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control		4,389								Full orchard production	Number of ramets treated
3 Monitoring		3,120								Full orchard production	Number of ramets monitored
350 Technical Support											
1 Phenology data collection		1 report								Effective management of seed production	Phenology data
2											
3											
4											
5 Pitch moth control techniques		1 report								Effective control of pitch moth in pli orchards	Report
6											
	Past Yr	Current Yr	Next Yr								

File: 12PlPGlow24JULY2000

BUDGETS

Pinus contorta - Interior Lodgepole Pine (PG, low)

12 Pli PG low <1100 m										
Prog. Tot Value Rank 12/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS
200 BREEDING PROGRAMS	FRBC BUDGETS '000S									
210 Selection										0.0
1 Families selected for breeding arboreta										*0.0*
220 Breed. Arboreta & Mating										0.0
1 Breeding arboreta (remeta)										0.0
2 Mating										*0.0*
230 Progeny testing										0.0
1 Design			30.0							30.0
2 Establish				10.0	10.0	10.0	10.0			40.0
3 Maintain							10.0			10.0
4 Measure							0.0			0.0
5 Analyze										*80.0*
240 Technical Support		58.2	10.0	10.0	25.0	6.0	6.0	6.0	6.0	127.2
1 Realized Gain trial			10.0							10.0
2 Intra / Inter Provenance crossing trial										0.0
3 Wood testing										0.0
4										0.0
5										0.0 *137.2*
6										
	0.0	58.2	50.0	20.0	35.0	16.0	26.0	6.0	6.0	*Sub-TOT* *217.2*
300 SEED PRODUCTION										
310 Expanded Production			X	X						0.0
1 Grafting for new or expanded orchards										0.0
2 New orchards			X	X						0.0
3 Orchard expansions			X	X	X	X	X	X	X	0.0
4 Orchard management										*0.0*
320 Quality/Quantity Boosts		1.5								1.5
1 Grafting for ramet replacement										0.0
2 Ramet replacement										0.0
3 Roguing		5.0	X	X						5.0
4 SMP / CP										0.0
5 Induction		5.8	X	X	X	X	X	X	X	5.8
6 Orchard management/holding beds										*12.3*
330 Vegetative Propagation										0.0
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										*0.0*
340 Pest Management		14.4	X	X	X	X	X	X	X	14.4
1 Insect control		1.5								1.5
2 Disease control		3.5								3.5
3 Monitoring										*19.3*
350 Technical Support		1.5	X	X						1.5
1 Phenology data collection										
2										
3										
4		6.0								6.0
5 Pitch mush control techniques										
6										*7.5*
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	39.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	0.0	97.2	50.0	20.0	35.0	16.0	26.0	6.0	6.0	256.2 256.2

16	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 16PliTOhigh24JULY2000

Pinus contorta - Interior Lodgepole Pine (TO, high)

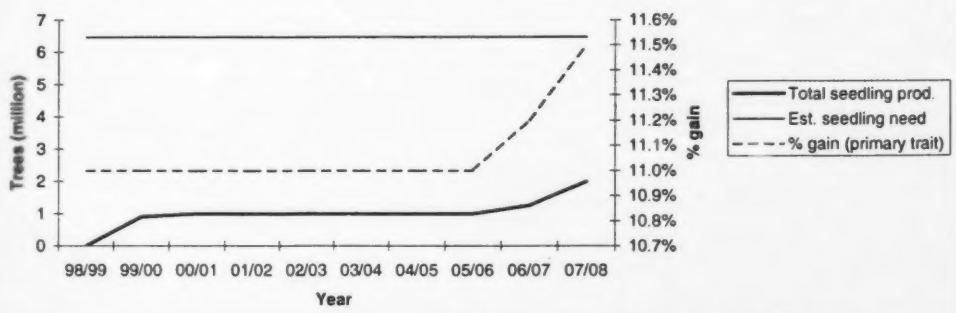
Pli TO high **>1400 m**

Seedling need (million):	6.5
Program total value rank:	16

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin.	188	188	188	188	188	188	188	188	188	188
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
310 Eagle Rock (Riv)	0.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
GenSeed expansion				0.0	0.0	0.0	0.0	0.0	0.3	1.0
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
310 Eagle Rock (Riv)	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
GenSeed expansion				12%	12%	12%	12%	12%	12%	12%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.3	2.0
Total gain	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 16PliTOhigh24JULY2000

ORCHARDS

Pinus contorta - Interior Lodgepole Pine (TO, high)

16 Pli TO high >1400 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
Eagle Rock	310	41	11%	646	646	5.9	1,500	1.0	
		Total ramets		**646**	**646**	F15	**Total production**	**0.969**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**1.0** I19

Annual planting	**6.465**	I21	
Deficit	**-5.496**	I22	I19-I21
Ramets required	**4,310**	I23	I21*1,000,000/F27
Ramets required with over-capacity	**5,603**	I24	I23*1.2
Projected necessary expansion	**4,957**		I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	**1,500**	F27
Planned over-production capacity =	**1.3**	
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Expansion required and underway

File: 16PliTOhigh24JULY2000

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (TO, high)

16 Pli TO high >1400 m Prog. Tot Value Rank 16/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 8.485	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**PERFORMANCE INDICATORS**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed. Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets (1000)
2 Mating										Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish										Progeny tests establ. to design specifications	Number of test sites
3 Maintain										Progeny test trees free-growing	Number of test sites maintained
4 Measure										Sites measured as in strategy	Number of test sites measured
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1											
2											
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards		4,890	X	X						Full production capacity	Number of grafts made
2 New orchards				X	X					Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management					X	X	X	X	X	Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made
2 Ramet replacement		400								Genetic gain for primary trait	Number of ramets replaced
3 Roguing										Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP		582	X	X						Genetic gain for primary trait	Number of ramets treated
5 Induction										Orchard production	Number of ramets induced
6 Orchard management/holding beds		148								Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control: Leptoglossus, aphite bugs		582	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring		582	X	X	X	X	X	X	X	Full orchard production	Number of ramets monitored
350 Technical Support											
1 Seedlot rating study		1 report								Effective seedlot rating system	Report
2											
3											
4											
5											
6											
	Past Yr	Current Yr	Next Yr								

File 16PliTOhigh24JULY2000

BUDGETS

Pinus contorta - Interior Lodgepole Pine (TO, high)

16 Pli TO high >1400 m										
Prog. Tot Value Rank 16/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0
										0.0
220 Breed. Arboreta & Mating										
1 Breeding arboreta (remeta)										0.0
2 Mating										0.0
										0.0
230 Progeny testing										
1 Design										0.0
2 Establish										0.0
3 Maintain										0.0
4 Measure										0.0
5 Analyze										0.0
										0.0
240 Technical Support										
1										0.0
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*Sub-TOT* *0.0*
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards		X	X	X						0.0
2 New orchards			X	X						0.0
3 Orchard expansions										0.0
4 Orchard management			X	X	X	X	X	X	X	0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement										0.0
2 Ramet replacement		4.8								4.8
3 Roguing										0.0
4 SMP / CP		4.8	X	X						4.8
5 Induction										0.0
6 Orchard management/holding beds		4.8								4.8
										14.4
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control: Lepidoptoseus, spittle bugs		1.1	X	X	X	X	X	X	X	1.1
2 Disease control			X	X	X	X	X	X	X	0.0
3 Monitoring		1.1	X	X	X	X	X	X	X	1.1
										2.3
350 Technical Support										
1 Seedlot rating study		37.9								37.9
2										
3										
4										
5										
	Past Yr	Current Yr	Next Yr							*37.9*
SUB TOT	0.0	54.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	0.0	54.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.6 54.6

17 GENETIC IMPROVEMENT STRATEGY TIMELINE

File 17PliBVlow25JULY2000

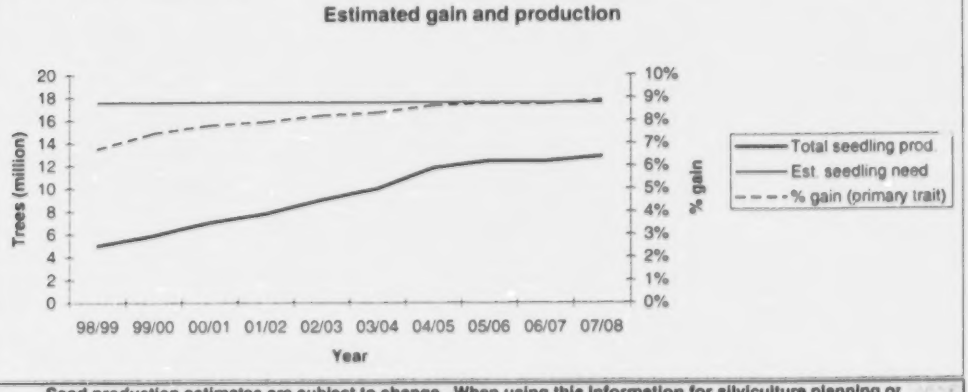
Pinus contorta - Interior Lodgepole Pine (BV, low)

Pli BV low **<1100 m**

Seedling need (million):	17.6
Program total value rank:	17

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	296	296	296	296	296	296	296	296	296	296
Polycross										
Clonal										
F1					150	150	150	150	150	150
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
204 MoF PGTIS	1.6	1.4	1.4	1.4	1.2	1.2	1.2	1.2	1.2	1.2
228 MoF PGTIS	1.1	1.3	1.5	1.7	2.2	2.4	2.4	2.4	2.4	2.4
219 VSOC	2.3	3.2	4.1	4.7	5.6	6.4	8.2	8.8	8.8	8.8
GenSeed expansions				0.0	0.0	0.0	0.0	0.0	0.0	0.4
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
204 MoF PGTIS	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
228 MoF PGTIS	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
219 VSOC	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
GenSeed expansions				14%	14%	14%	14%	14%	14%	14%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	5.0	5.9	7.0	7.8	9.0	10.0	11.8	12.4	12.4	12.8
Total gain	7%	7%	8%	8%	8%	8%	9%	9%	9%	9%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 17PliBVlow25JULY2000

ORCHARDS

Pinus contorta - Interior Lodgepole Pine (BV, low)

17 Pli BV low **<1100 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF PGTIS	204	120	2%	982	800	7.3	1,500	**1.2**	I8
MoF PGTIS	228	40	6%	1,600	1,587	14.4	1,500	**2.4**	
VSOC	219	65	10%	5,850	5,850	53.1	1,500	**8.8**	
									I15
		Total ramets		**8,432**	**8,237**	F16	**Total production**	**12.356**	I16 SUM(I8:I15)

Vegetative propagation

Stecklings/Emblings	**0.0**	I18	
Total production	**12.4**	I20	I16+I18+I20

Annual planting	**17.550**	I22	
Deficit	**-5.195**	I23	I20-I22
Ramets required	**11,700**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**15,210**	I25	I24*F29
Projected necessary expansion	**6,973**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,500		F28
Planned over-production capacity = 1.3		F29
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Projected deficit requires expansion of existing orchards or new orchard.

File: 17PliBVlow25JULY2000

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (BV, low)

17 Pli BV low <1100 m											Annual planting million		
Prog. Tot Value Rank 17/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		17.550		
300 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**										**KEY SUCCESS FACTORS**		**PERFORMANCE INDICATORS**
310 Selection													
› Families selected for breeding arboreta											Advanced generation selections made		Number of selections made
320 Breed. Arboreta & Mating													
› Breeding arboreta (ramets)											Breeding populations established		Number of ramets
› Mating	30	30	30								Breeding strategy crosses made on time		Number of crosses
330 Progeny testing													
› Design	2000										Strategic and efficient mating and test design		Year design finalized
› Establish		2		3							Progeny tests establ. to design specifications		Number of test sites
› Maintain					3	3	3	3	3		Progeny test trees free-growing		Number of test sites maintained
› Measure									3		Sites measured as in strategy		Number of test sites measured
› Analyze									3		Test data analysis does not delay selections		Number of test series analyzed
340 Technical Support													
› Interior provenance crossing study											Guidelines on inter prov crossing		Report and guidelines
›													
›													
›													
›													
›													
350 SEED PRODUCTION													
310 Expanded Production													
› Grafting for new or expanded orchards		2,800	X	X							Full production capacity		Number of grafts made
› New orchards				X	X						Full production capacity		Number of ramets established
› Orchard expansions											Full production capacity		Number of ramets established
› Orchard management				X	X	X	X	X	X		Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts													
› Grafting for ramet replacement		133									Ramets available for replacement		Number of grafts made
› Ramet replacement											Genetic gain for primary trait		Number of ramets replaced
› Roguing			X	X							Genetic gain for primary trait		Number of ramets rogued
› SMP / CP		8,550	X	X							Genetic gain for primary trait		Number of ramets treated
› Induction											Orchard production		Number of ramets induced
› Orchard management/hedging tasks		283	X	X	X	X	X	X	X		Productive orchard		Number of ramets maintained
330 Vegetative Propagation													
› Rooted cuttings											High genetic worth materials bulked up		Millions of rooted cuttings produced
› SE											High genetic worth materials bulked up		Thousands of somatic seedlings produced
› Other											High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management													
› Insect control		5,850	X	X	X	X	X	X	X		Full orchard production		Number of ramets treated
› Disease control		5,850	X	X	X	X	X	X	X		Full orchard production		Number of ramets treated
› Monitoring		1,506	X	X	X	X	X	X	X		Full orchard production		Number of ramets monitored
350 Technical Support													
›													
› Phenology assessments		1 report									Effective on management (higher seed yield)		Report on phenology
›													
› Phenology assessments		1 report									Effective on management (higher seed yield)		Report on phenology
›													
›													
›													
	Past Yr	Current Yr	Next Yr										

File: 17PSBVsw05JULY2000

BUDGETS

Pinus contorta - Interior Lodgepole Pine (BV, low)

17 PS BV low <1100 m										
Prog. Tot Value Rank 17/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '0000									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0 0.0
220 Breed. Arboreta & Mating										
1 Breeding arboreta (remeas)										0.0
2 Mating	10.0	12.5	10.0							32.5 32.5
230 Progeny testing										
1 Design	0.0									0.0
2 Establish		12.4		15.0	30.0					57.4
3 Maintain						10.0	10.0	10.0	10.0	40.0
4 Measure									20.0	20.0
5 Analyze									0.0	0.0 117.4
240 Technical Support										
1 Intra/inter provenance crossing study										0.0
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0 0.0
	10.0	24.9	10.0	15.0	30.0	10.0	10.0	10.0	30.0	Sub-TOT 149.9
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards		X	X	X						0.0
2 New orchards				X	X					0.0
3 Orchard expansions										0.0
4 Orchard management				X	X	X	X	X	X	0.0 0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement		2.5								2.5
2 Ramet replacement			X	X						0.0
3 Rogung			X	X						0.0
4 SMP / CP		6.4	X	X						6.4
5 Induction										0.0
6 Orchard management/holding beds		6.4	X	X	X	X	X	X	X	6.4 15.2
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0 0.0
340 Pest Management										
1 Insect control		2.5	X	X	X	X	X	X	X	2.5
2 Disease control		2.5	X	X	X	X	X	X	X	2.5
3 Monitoring		3.9	X	X	X	X	X	X	X	3.9 8.8
350 Technical Support										
1										
2 Phenology assessments		3.9								3.9
3										
4 Phenology assessments		2.5								2.5
5										
6										6.4
	Past Yr	Current Yr	Next Yr							30.4
SUB TOT	0.0	30.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	10.0	55.4	10.0	15.0	30.0	10.0	10.0	10.0	30.0	180.4 180.4

18	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 18PliCPlow 25JULY2000

Pinus contorta - Interior Lodgepole Pine (CP, low)

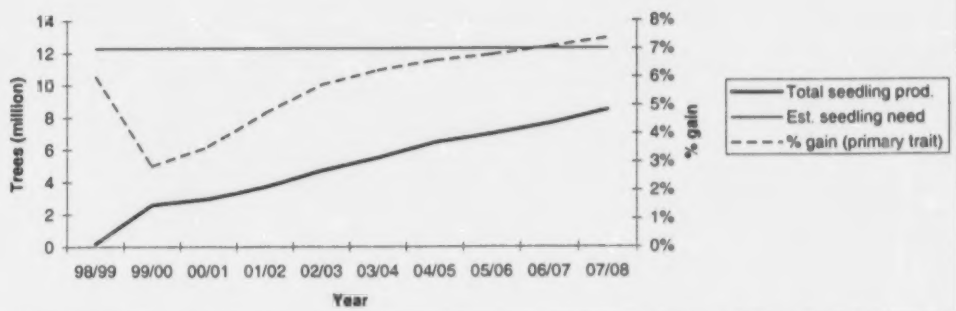
Pli CP low **<1000 m**

Seedling need (million):	12.3
Program total value rank:	18

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	277	277	277	277	277	277	277	277	277	277
Polycross										
Clonal										
F1									150	150
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
201 MoF (PGTIS) (+202)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
223 MoF (PGTIS)	0.2	0.6	0.7	0.8	1.0	1.1	1.4	1.5	1.5	1.5
218 VSOC	0.0	0.0	0.2	0.9	1.7	2.4	3.0	3.4	4.1	4.7
GenSeed expansions					0.0	0.0	0.0	0.0	0.0	0.2
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
201 MoF (PGTIS) (+202)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
223 MoF (PGTIS)	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
218 VSOC	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
GenSeed expansions					11%	11%	11%	11%	11%	11%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.2	2.6	3.0	3.7	4.7	5.5	6.5	7.0	7.6	8.5
Total gain	6%	3%	4%	5%	6%	6%	7%	7%	7%	7%

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 18PliCPlow 25JULY2000

ORCHARDS

Pinus contorta - Interior Lodgepole Pine (CP, low)

18 Pli CP low <1000 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings		
MoF PGTIS	201	62	2%	1,359	1,359	12.3	1,500	2.0	I8	
MoF PGTIS	223	40	6%	1,000	997	9.1	1,500	1.5		
VSOC	218	65	10%	4,300	4,300	39.1	1,500	6.5		
								0.0		
								0.0		
								0.0		
								0.0		
								0.0	I15	
		Total ramets		6,659	6,656	F16	**Total production**	9.984	I16	SUM(I8:I15)
Vegetative propagation							**Stecklings/Emblings**	0.0	I18	
							Total production	10.0	I20	I16+I18+I20
							Annual planting	12.270	I22	
							Deficit	-2.286	I23	I20-I22
							Ramets required	8,180	I24	I22*1,000,000/F28
							Ramets required with over-capacity	10,634	I25	I24*F29
							Projected necessary expansion	3,978		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	1,500	F28
Planned over-production capacity =	1.3	F29
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Projected deficit requires expansion of existing orchards or new orchard.

ACTIVITIES

File: 18PICPlow 25JULY2000

Pinus contorta - Interior Lodgepole Pine (CP, low)

18 PII CP low <1000 m Prog. Tot Value Rank 18/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 12.270	
	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS	KPI DESCRIPTION
200 BREEDING PROGRAMS											
210 Selection 1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating 1 Breeding arboreta (ramets) 2 Mating				66	66					Breeding populations established Breeding strategy crosses made on time	Number of ramets Number of crosses
230 Progeny testing 1 Design 2 Establish 3 Maintain 4 Measure 5 Analyze						2664	1	2	3	Strategic and efficient mating and test design Progeny tests establ. to design specifications Progeny test trees free-growing Sites measured as in strategy Test data analysis does not delay selections	Year design finalized Number of test sites Number of test sites maintained Number of test sites measured Number of test series analyzed
240 Technical Support 1 2 3 4 5 6											
300 SEED PRODUCTION											
310 Expanded Production 1 Grafting for new or expanded orchards 2 New orchards 3 Orchard expansions 4 Orchard management			1,280	X	X X	X X	X	X	X	X	Full production capacity Full production capacity Full production capacity Productive orchard (higher GW seedlots)	Number of grafts made Number of ramets established Number of ramets established Number of ramets maintained
320 Quality/Quantity Boosts 1 Grafting for ramet replacement 2 Ramet replacement 3 Rogueing 4 SMP / CP 5 Induction 6 Orchard management/rouging tests			219 710 219	X X X	X X X	X X X	X X X	X X X	X X X	X X X	Ramets available for replacement Genetic gain for primary trait Genetic gain for primary trait Genetic gain for primary trait Orchard production Productive orchard	Number of grafts made Number of ramets replaced Number of ramets rogued Number of ramets treated Number of ramets induced Number of ramets maintained
330 Vegetative Propagation 1 Rooted cuttings 2 EE 3 Other											High genetic worth materials bulked up High genetic worth materials bulked up High genetic worth materials bulked up	Millions of rooted cuttings produced Thousands of somatic seedlings produced Numbers of propagules produced
340 Pest Management 1 Insect control 2 Disease control 3 Monitoring			4,360 4,360 1,160	X X X	X X X	X X X	X X X	X X X	X X X	X X X	Full orchard production Full orchard production Full orchard production	Number of ramets treated Number of ramets treated Number of ramets monitored
350 Technical Support 1 Phenology assessments 2 Phenology assessments 3 4 5 6			1 report 1 report								Efficient SMP more seed better GW Efficient SMP more seed better GW	Report Report
		Past Yr	Current Yr	Next Yr							

BUDGETS

File: 18PliCPlow 25JULY2000

Pinus contorta - Interior Lodgepole Pine (CP, low)

18 Pli CP low <1000 m Prog. Tot Value Rank 18/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS
	FRBC BUDGETS '000$									
200 BREEDING PROGRAMS										0.0 *0.0*
210 Selection 1 Families selected for breeding arboreta										0.0 20.0 *20.0*
220 Breed. Arboreta & Mating 1 Breeding arboreta (remeta) 2 Mating				10.0	10.0					0.0 45.0 10.0 0.0 0.0 *55.0*
230 Progeny testing 1 Design 2 Establish 3 Maintain 4 Measure 5 Analyze						0.0	15.0	30.0	10.0	0.0 0.0 0.0 0.0 0.0 *0.0*
240 Technical Support 1 2 3 4 5 6										Sub-TOT *75.0*
	0.0	0.0	0.0	10.0	10.0	0.0	15.0	30.0	10.0	
300 SEED PRODUCTION										
310 Expanded Production 1 Grafting for new or expanded orchards 2 New orchards 3 Orchard expansions 4 Orchard management		X	X	X X	X X	X	X	X	X	0.0 0.0 0.0 0.0 *0.0*
320 Quality/Quantity Boosts 1 Grafting for ramet replacement 2 Ramet replacement 3 Rogung 4 SMP / CP 5 Induction 6 Orchard management/holding beds		0.7 3.3 0.7	X X X	X X X	X X X	X X X	X X X	X X X	X X X	0.7 0.0 0.0 3.3 0.0 0.7 *4.699*
330 Vegetative Propagation 1 Rooted cuttings 2 SE 3 Other										0.0 0.0 0.0 *0.000*
340 Pest Management 1 Insect control 2 Disease control 3 Monitoring		0.7 0.7 3.3	X X X	X X X	X X X	X X X	X X X	X X X	X X X	0.7 0.7 3.3 *4.699*
350 Technical Support 1 Phenology assessments 2 Phenology assessments 3 4 5		0.7 3.3								0.7 3.3 *4.017*
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.4 88.4
GRAND TOTALS	0.0	13.4	0.0	10.0	10.0	0.0	15.0	30.0	10.0	

20	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 20PliNEhi19JULY2000

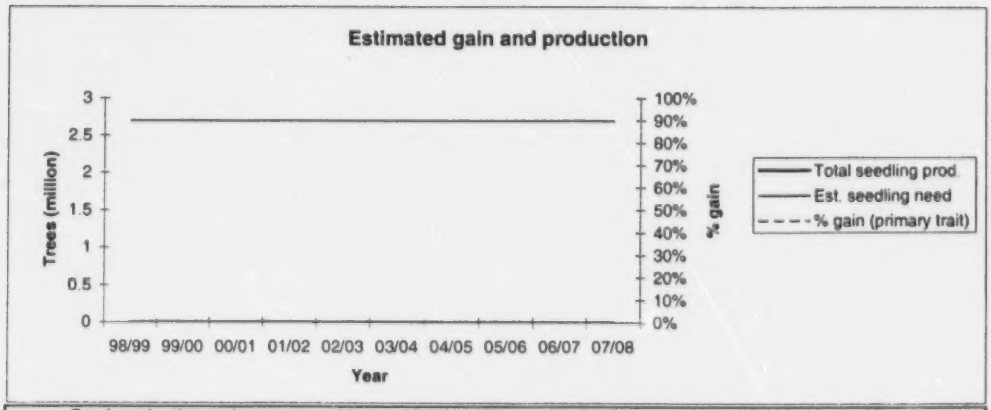
Pinus contorta - **Interior Lodgepole Pine (NE, high)**

Pli NE high **>1400 m**

Seedling need (million):	2.7
Program total value rank:	20

Traits for improvement:	
Primary	
Secondary	

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin										
Polycross										
Clonal	No progeny tests at present time									
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
none	No seed orchards at present time									
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
none										
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total gain	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 20PliNEhi19JULY2000

ORCHARDS

***Pinus contorta* - Interior Lodgepole Pine (NE, high)**

20 Pli NE high **>1400 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
None									I8
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	
								0.0	I15
		Total ramets		0	0	F16	**Total production**	0.000	I16

SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	0.0	I18
	Total production	0.0	I20

I16+I18+I20

Annual planting	2.697	I22	
Deficit	-2.697	I23	I20-I22
Ramets required	2,697	I24	I22*1,000,000/F28
Ramets required with over-capacity	3,506	I25	I24*F29
Projected necessary expansion	3,506		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,000		F28
Planned over-production capacity = 1.3		F29
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Breeding program and orchard urgently required.

File: 20PliNEh26JULY2000

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (NE, high)

20 Pli NE high >1400 m											Annual planting million		
Prog. Tst Value Rank 20/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		2.597		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**										**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection													
1 Families selected for breeding arboreta											Advanced generation selections made		Number of selections made
220 Breed. Arboreta & Mating													
1 Breeding arboreta (ramets)											Breeding populations established		Number of ramets (1000)
2 Mating											Breeding strategy crosses made on time		Number of crosses
230 Progeny testing	Program status review required												
1 Design											Strategic and efficient mating and test design		Year design finalized
2 Establish											Progeny tests establ. to design specifications		Number of test sites
3 Maintain											Progeny test trees free-growing		Number of test sites maintained
4 Measure											Sites measured as in strategy		Number of test sites measured
5 Analyze											Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support													
1													
2													
3													
4													
5													
6													
300 SEED PRODUCTION													
310 Expanded Production													
1 Grafting for new or expanded orchards											Full production capacity		Number of grafts made
2 New orchards											Full production capacity		Number of ramets established
3 Orchard expansions											Full production capacity		Number of ramets established
4 Orchard management											Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts													
1 Grafting for ramet replacement											Ramets available for replacement		Number of grafts made
2 Ramet replacement											Genetic gain for primary trait		Number of ramets replaced
3 Roguing											Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP											Genetic gain for primary trait		Number of ramets treated
5 Induction											Orchard production		Number of ramets treated
6 Orchard management/holding beds											Productive orchard		Number of ramets maintained
330 Vegetative Propagation													
1 Rooted cuttings											High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE											High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other											High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management													
1 Insect control											Full orchard production		Number of ramets treated
2 Disease control											Full orchard production		Number of ramets treated
3 Monitoring											Full orchard production		Surveys conducted
350 Technical Support													
1													
2													
3													
4													
5													
	Past Yr	Current Y	Next Yr										

File: 20PliNEhi19JULY2000

BUDGETS

Pinus contorta - Interior Lodgepole Pine (NE, high)

20 Pli NE high >1400 m												
Prog. Tot Value Rank 20/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08			
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS		
210 Selection												
1 Families selected for breeding arboreta										0.0		
												0.0
220 Breed. Arboreta & Mating												
1 Breeding arboreta (remetal)										0.0		
2 Mating										0.0		
												0.0
230 Progeny testing **Program status review required**												
1 Design										0.0		
2 Establish										0.0		
3 Maintain										0.0		
4 Measure										0.0		
5 Analyze										0.0		
												0.0
240 Technical Support												
1										0.0		
2										0.0		
3										0.0		
4										0.0		
5										0.0		
6										0.0		*0.0*
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*Sub-TOT*		*0.0*
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										0.0		
2 New orchards										0.0		
3 Orchard expansions										0.0		
4 Orchard management										0.0		
												0.0
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										0.0		
2 Ramet replacement										0.0		
3 Roguing										0.0		
4 SMP / CP										0.0		
5 Induction										0.0		
6 Orchard management/holding beds										0.0		
												0.0
330 Vegetative Propagation												
1 Rooted cuttings										0.0		
2 SE										0.0		
3 Other										0.0		
												0.0
340 Pest Management												
1 Insect control										0.0		
2 Disease control										0.0		
3 Monitoring										0.0		
												0.0
350 Technical Support												
1										0.0		
2										0.0		
3												
4												
5												
6												*0.0*
	Past Yr	Current Yr	Next Yr									
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
GRAND TOTALS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0

26 GENETIC IMPROVEMENT STRATEGY TIMELINE

File 26PliPGhigh19JULY2000.xls

Pinus contorta - Interior Lodgepole Pine (PG, high)

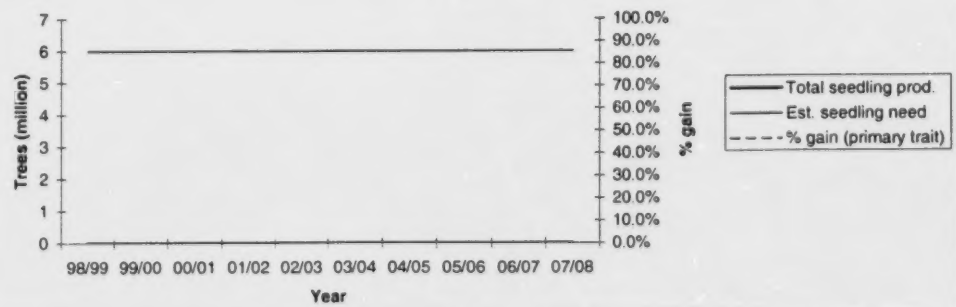
Pli PG high **>1100 m**

Seedling need (million):	6.0
Program total value rank:	26

Traits for improvement:	
Primary	
Secondary	

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin										
Polycross										
Clonal	No progeny tests at present time									
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)	No seed orchards at present time									
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total gain										

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 26PliPGhigh19JULY2000.xls

ORCHARDS

***Pinus contorta* - Interior Lodgepole Pine (PG, high)**

26 Pli PG high **>1100 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings		
None									I8	
								0.0		
								0.0		
								0.0		
								0.0		
								0.0		
								0.0		
								0.0	I15	
		Total ramets		0	0	F16	**Total production**	0.000	I16	SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	0.0	I18
	Total production	0.0	I20

Annual planting	6.000	I22	
Deficit	-6.000	I23	I20-I22
Ramets required	4,000	I24	I22*1,000,000/F28
Ramets required with over-capacity	5,200	I25	I24*F29
Projected necessary expansion	5,200		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	1,500	F28
Planned over-production capacity =	1.3	F29
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Projected deficit requires new orchard capacity.

File 26PliPGhigh19JULY2000.xls

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (PG, high)

26 Pli PG high >1100 m										Annual planting million		
Prog. Tot Value Rank 26/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	6.000		
200 BREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS		KPI DESCRIPTION
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made		Number of selections made
220 Breed Arboreta & Mating												
1 Breeding arboreta (ramets)										Breeding populations established		Number of ramets (1000)
2 Mating										Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design										Strategic and efficient mating and test design		Year design finalized
2 Establish				4						Progeny tests establ to design specifications		Number of test sites
3 Maintain					4	4			4	Progeny test trees free-growing		Number of test sites maintained
4 Measure									4	Sites measured as in strategy		Number of test sites measured
5 Analyze									1	Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1												
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement		Number of grafts made
2 Ramet replacement										Genetic gain for primary trait		Number of ramets replaced
3 Rogueing										Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP										Genetic gain for primary trait		Number of ramets treated
5 Induction										Orchard production		Number of ramets induced
6 Orchard management/holding beds										Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control										Full orchard production		Number of ramets treated
2 Disease control										Full orchard production		Number of ramets treated
3 Monitoring										Full orchard production		Surveys conducted
350 Technical Support												
1												
2												
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File: 26PlPGhigh19JULY2000.xls

BUDGETS

Pinus contorta - Interior Lodgepole Pine (PG, high)

26 PII PG high >1100 m											
Prog. Tot Value Rank: 26/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection										0.0	
1 Families selected for breeding arboreta											0.0
220 Breed. Arboreta & Mating										0.0	
1 Breeding arboreta (remeta)										0.0	
2 Mating											0.0
230 Progeny testing	0.0									0.0	
1 Design		80.0	80.0							160.0	
2 Establish			30.0	30.0	30.0	30.0	30.0	30.0		180.0	
3 Maintain					10.0			10.0		20.0	
4 Measure					0.0			0.0		0.0	
5 Analyze											360.0
240 Technical Support										0.0	
1										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6											0.0
SUB TOT	0.0	80.0	110.0	30.0	40.0	30.0	30.0	40.0	0.0	Sub-TOT	360.0
300 SEED PRODUCTION											
310 Expanded Production										0.0	
1 Grafting for new or expanded orchards										0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management											0.0
320 Quality/Quantity Boosts										0.0	
1 Grafting for roguing replacement										0.0	
2 Ramet replacement										0.0	
3 Rogueing										0.0	
4 SMP / CP										0.0	
5 Induction										0.0	
6 Orchard management/holding beds											0.0
330 Vegetative Propagation										0.0	
1 Rooted cuttings										0.0	
2 TE										0.0	
3 Other											0.0
340 Pest Management										0.0	
1 Insect control										0.0	
2 Disease control										0.0	
3 Monitoring											0.0
350 Technical Support										0.0	
1										0.0	
2										0.0	
3											0.0
4											
5											
6	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	0.0	80.0	110.0	30.0	40.0	30.0	30.0	40.0	0.0	360.0	360.0

29	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 29PliEKhigh19JULY2000.xls

Pinus contorta - Interior Lodgepole Pine (EK, high)

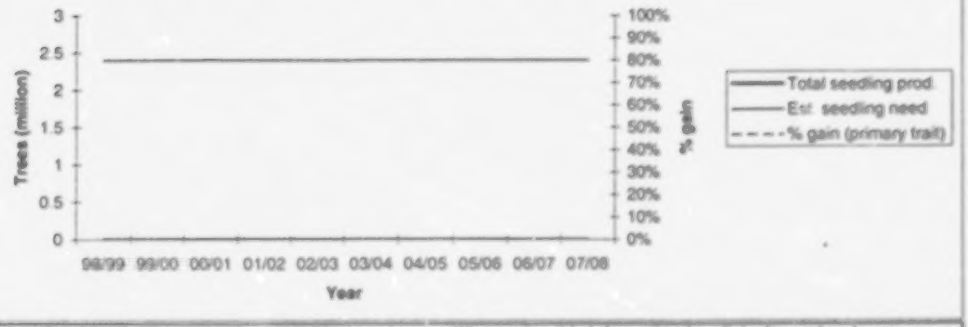
Pli EK high >1400 m

Seedling need (million):	2.4
Program total value rank:	29

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin										
Polycross										
Clonal	No progeny tests at present time									
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)	No orchards at present time									
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Total gain										

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 29PliEKhigh19JULY2000.xls

ORCHARDS

Pinus contorta - Interior Lodgepole Pine (EK, high)

29 Pli EK high >1400 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
None									I8
									I15
		Total ramets		**0**	**0**	F16	**Total production**	**0.000**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**0.0**	I20 I16+I18+I20

Annual planting	**2.400**	I22	
Deficit	**-2.400**	I23	I20-I22
Ramets required	**1,600**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**2,080**	I25	I24*F29
Projected necessary expansion	**2,080**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,500		F28
Planned over-production capacity = 1.3		F29
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Projected deficit requires new orchard.

File: 29PliEKhigh19JULY2000.xls

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (EK, high)

29 Pli EK high >1400 m										Annual planting million		
Prog. Tot Value Rank 29/43	98/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	2.400		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made		Number of selections made
220 Breed. Arboreta & Mating												
1 Breeding arboreta (ramets)										Breeding populations established		Number of ramets (1000)
2 Mating										Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design										Strategic and efficient mating and test design		Year design finalized
2 Establish				4	4	4	4	4	4	Progeny tests establ. to design specifications		Number of test sites
3 Maintain										Progeny test trees free-growing		Number of test sites maintained
4 Measure										Sites measured as in strategy		Number of test sites measured
5 Analyze										Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1												
2												
3												
4												
5												
6												
300 SEED PRODUCTION												
300 SEED PRODUCTION												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement		Number of grafts made
2 Ramet replacement										Genetic gain for primary trait		Number of ramets replaced
3 Rogung										Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP										Genetic gain for primary trait		Number of ramets treated
5 Induction										Orchard production		Number of ramets induced
6 Orchard management/holding beds										Productive orchard		Number of ramets maintained
330 Vegetative Propegation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control										Full orchard production		Number of ramets treated
2 Disease control										Full orchard production		Number of ramets treated
3 Monitoring										Full orchard production		Surveys conducted
350 Technical Support												
1												
2												
3												
4												
5												
6												
	Past Yr	Current Yr	Next Yr									

File: 29PliEKhigh19JULY2000.xls

BUDGETS

Pinus contorta - Interior Lodgepole Pine (EK, high)

29 Pli EK high >1400 m										
Prog. Tot Value Rank 29/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0
										0.0
220 Breed. Arboreta & Mating										
1 Breeding arboreta (remote)										0.0
2 Mating										0.0
										0.0
230 Progeny testing										
1 Design										0.0
2 Establish				30.0						30.0
3 Maintain					30.0	20.0	20.0	20.0	20.0	110.0
4 Measure										0.0
5 Analyze										0.0
										140.0
240 Technical Support										
1										0.0
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0
										0.0
SUB TOT	0.0	0.0	0.0	30.0	30.0	20.0	20.0	20.0	20.0	Sub-TOT 140.0
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement										0.0
2 Ramet replacement										0.0
3 Rogueing										0.0
4 SMP / CP										0.0
5 Induction										0.0
6 Orchard management/holding beds										0.0
										0.0
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control										0.0
2 Disease control										0.0
3 Monitoring										0.0
										0.0
350 Technical Support										
1										0.0
2										0.0
3										0.0
4										
5										
6										
	Prev Yr	Current Yr	Next Yr							0.0
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	0.0	0.0	0.0	30.0	30.0	20.0	20.0	20.0	20.0	140.0 140.0

32 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 32PliEKlow19JULY2000.xls

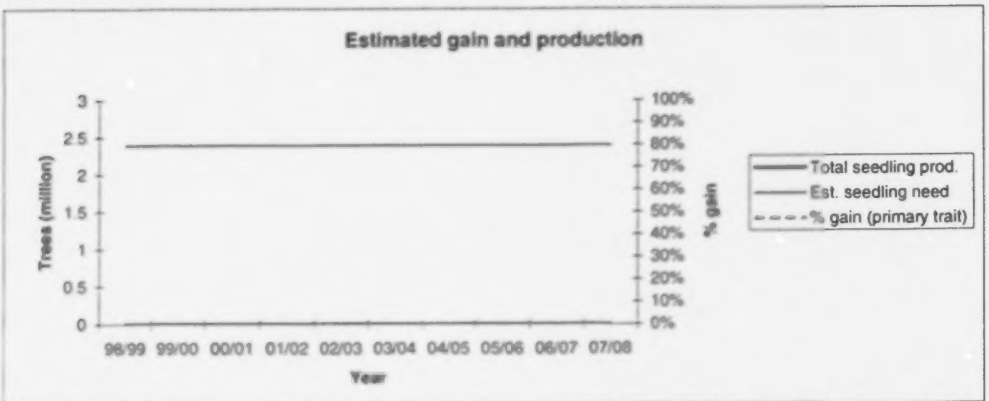
Pinus contorta - Interior Lodgepole Pine (EK, low)

PII EK low **<1400 m**

Seedling need (million):	2.4
Program total value / rank:	32

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polln										
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)	No orchards established at present time									
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total gain										



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 32PliEKlow19JULY2000.xls

ORCHARDS

***Pinus contorta* - Interior Lodgepole Pine (EK, low)**

32 Pli EK low **<1400 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
None									I8
									I15
		Total ramets		**0**	**0**	F16	**Total production**	**0.000**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**0.0**	I20 I16+I18+I20

Annual planting	**2.394**	I22	
Deficit	**-2.394**	I23	I20-I22
Ramets required	**1,596**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**2,075**	I25	I24*F29
Projected necessary expansion	**2,075**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 1,500		F28
Planned over-production capacity = 1.3		F29
Seed weight	254	seeds/g
Seedling recovery factor	0.65	seedlings/seed

Conclusions: Projected deficit requires new orchard.

File: 32PlEKlow19JULY2000.xls

ACTIVITIES

Pinus contorta - Interior Lodgepole Pine (EK, low)

32 Pli EK low <1400 m										Annual planting million	
Prog. Tot Value Rank 32/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	2.394	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets
2 Mating										Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish		3								Progeny tests establ. to design specifications	Number of test sites
3 Maintain			3							Progeny test trees free-growing	Number of test sites maintained
4 Measure						3				Sites measured as in strategy	Number of test sites measured
5 Analyze						1				Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1											
2											
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards							X	X		Full production capacity	Number of grafts made
2 New orchards								X	X	Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Roguing										Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP										Genetic gain for primary trait	Number of ramets treated
5 Induction										Orchard production	Number of ramets induced
6 Orchard management/holding beds										Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control										Full orchard production	Number of ramets treated
2 Disease control										Full orchard production	Number of ramets treated
3 Monitoring										Full orchard production	Surveys conducted
350 Technical Support											
1											
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File: 32PliEKlow19JULY2000.xls

BUDGETS

Pinus contorta - Interior Lodgepole Pine (EK, low)

32 Pli EK low <1400 m											
Prog. Tot Value Rank 32/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta										0.0	
											0.0
220 Breed. Arboreta & Mating											
1 Breeding arboreta (remeta)										0.0	
2 Mating										0.0	
											0.0
230 Progeny testing											
1 Design										0.0	
2 Establish	12.0	19.4								31.4	
3 Maintain			5.0	5.0	5.0					15.0	
4 Measure						12.0				12.0	
5 Analyze						0.0				0.0	
											58.4
240 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	
											0.0
SUB TOT	12.0	19.4	5.0	5.0	5.0	12.0	0.0	0.0	0.0	*Sub-TOT*	*58.4*
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards							X	X		0.0	
2 New orchards								X	X	0.0	
3 Orchard expansions										0.0	
4 Orchard management										0.0	
											0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										0.0	
2 Ramet replacement										0.0	
3 Roguing										0.0	
4 SMP / CP										0.0	
5 Induction										0.0	
6 Orchard management/holding beds										0.0	
											0.0
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control										0.0	
2 Disease control										0.0	
3 Monitoring										0.0	
											0.0
350 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4											
5											
6											
	Past Yr	Current Yr	Next Yr								0.0
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	**12.0**	**19.4**	**5.0**	**5.0**	**5.0**	**12.0**	**0.0**	**0.0**	**0.0**	**58.4**	**58.4**

4	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 04SxNElow 19JULY2000

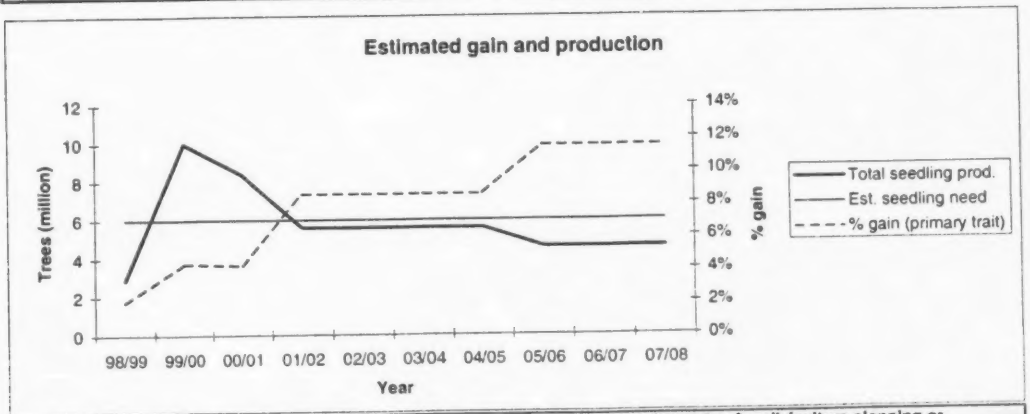
Picea glauca x engelmannii - Interior Spruce (NE, low)

Sx NE low **<1300 m**

Seedling need (million):	6.0
Program total value rank:	4

Traits for improvement:	
Primary:	Stem volume
Secondary:	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin.	270	270	270	270	270	270	270	270	270	270
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
305 MoF Kal	0.0	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
301 MoF Skim	2.9	6.4	6.4	3.6	3.6	3.6	3.6	2.6	2.6	2.6
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
305 MoF Kal	5%	5%	5%	6%	6%	6%	6%	7%	7%	7%
301 MoF Skim	2%	4%	4%	10%	10%	10%	10%	15%	15%	15%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	2.9	10.0	8.4	5.6	5.6	5.6	5.6	4.6	4.6	4.6
Total gain	2%	4%	4%	9%	9%	9%	9%	12%	12%	12%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File 04SxNElow 19JULY2000

ORCHARDS

Picea glauca x engelmannii - Interior Spruce (NE, low)

4 Sx NE low **<1300 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Kal	305	86	5%	1,000	500	9.0	4,000	2.0	
MoF Skim	301	153	2%	1,772	650	11.8	4,000	2.6	
		Total ramets		2,772	1,150	F15	**Total production**	4.600	I15

Vegetative propagation

Stecklings/Emblings 0.0 I17

Total production 4.6 I19

Annual planting	6.000	I21
Deficit	-1.400	I22
Ramets required	1,500	I23
Ramets required with over-capacity	1,800	I24
Projected necessary expansion	650	

I19-I21

I21*1,000,000/F27

I23*1.2

I4-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000 F27

Planned over-production capacity = 1.2

Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: Projected deficit requires expansion of existing orchard capacity. Roguing schedule and intensity may vary according to demand.

File: 04SxNElow 15JULY2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (NE, low)

4 Sx NE low <1300 m Prog. Tot Value Rank 4/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 6.000	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection - Candidates selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed. Arboreta & Mating - Breeding arboreta (ramets) - Mating		20								Breeding populations established Breeding strategy crosses made on time	Number of ramets Number of crosses
230 Progeny testing - Design - Establish - Maintain - Measure - Analyze		5 3								Strategic and efficient mating and test design Progeny tests establ. to design specifications Progeny test trees free-growing Sites measured as in strategy Test data analysis does not delay selections	Year design finalized Number of test sites Number of test sites maintained Number of test sites measured Number of test series analyzed
240 Technical Support - - - - - -											
300 SEED PRODUCTION											
310 Expanded Production - Grafting for new or expanded orchards - New orchards - Orchard expansions - Orchard management										Full production capacity Full production capacity Full production capacity Productive orchard (higher GW seedlots)	Number of grafts made Number of ramets established Number of ramets established Number of ramets maintained
320 Quality/Quantity Boosts - Grafting for ramet replacement - Ramet replacement - Rogueing - SMP / DP - Induction - Orchard management/testing tests		400 50 400 289 2,531								Ramets available for replacement Genetic gain for primary trait Genetic gain for primary trait Genetic gain for primary trait Orchard production Productive orchard	Number of grafts made Number of ramets replaced Number of ramets rogued Number of ramets treated Number of ramets induced Number of ramets maintained
330 Vegetative Propagation - Rooted cuttings - SE - Other										High genetic worth materials bulked up High genetic worth materials bulked up High genetic worth materials bulked up	Millions of rooted cuttings produced Thousands of somatic seedlings produced Numbers of propagules produced
340 Pest Management - Insect control - Disease control - Monitoring		2,249 2,349								Full orchard production Full orchard production Full orchard production	Number of ramets treated Number of ramets treated Number of ramets monitored
350 Technical Support - Summer planting (5 year measurements) - SPZ review for EA & NE - GA^3 computer model for weevil resistance - Nelder timber supply study - -	Past Yr	1 1 1 1 Current Yr	Next Yr							Operational recommendations re hot planting Seed transfer recommendations Informed deployment decisions re weevils Understanding timber supply implications	Report Report Report Report

File: 04SxNElow 19JULY2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (NE, low)

4 Sx NE low <1300 m											
Prog. Tot Value Rank 4/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection											
- Fam/bas selected for breeding arb/orch										0.0	
											0.0
220 Breed Arb/orch & Mating											
- Breeding arb/orch maintnd										0.0	
- Mating		2.0								2.0	
											2.0
230 Progeny testing											
- Design										0.0	
- Establish										0.0	
- Maintain		45.5								45.5	
- Measure		13.0								13.0	
- Analyze										0.0	
											58.5
240 Technical Support											
-										0.0	
-										0.0	
-										0.0	
-										0.0	
-										0.0	
-										0.0	
											0.0
	0.0	60.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Sub TOT	60.5
300 SEED PRODUCTION											
310 Expanded Production											
- Grafting for new or expanded orchards										0.0	
- New orchards										0.0	
- Orchard expansions										0.0	
- Orchard management										0.0	
											0.0
320 Quality/Quantity Boosts											
- Grafting for cone replacement		2.0								2.0	
- Ramet replacement		2.0								2.0	
- Registry		2.0								2.0	
- SMP / CP		2.0								2.0	
- Induction										0.0	
- Orchard management/holding costs		3.1								3.1	
											11.2
330 Vegetative Propagation											
- Rooted cuttings										0.0	
- SE										0.0	
- Other										0.0	
											0.0
340 Pest Management											
- Insect control		3.1								3.1	
- Disease control										0.0	
- Monitoring		39.2								39.2	
											42.3
350 Technical Support											
- Summer planting /5 year measurements		11.9								11.9	
- SPZ review for EK & NE		60.0								60.0	
- GAT computer model for weevil resistance		20.3								20.3	
- Nelson timber supply study		5.9								5.0	
-										0.0	
-											
	Past Yr	Current Yr	Next Yr								97.2
SUB TOT	0.0	159.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	0.0	211.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	211.2	211.2

5	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 05SxNEhigh 19JULY2000

***Picea glauca x engelmannii* - Interior Spruce (NE, high)**

Sx NE high **1300-1700 m**

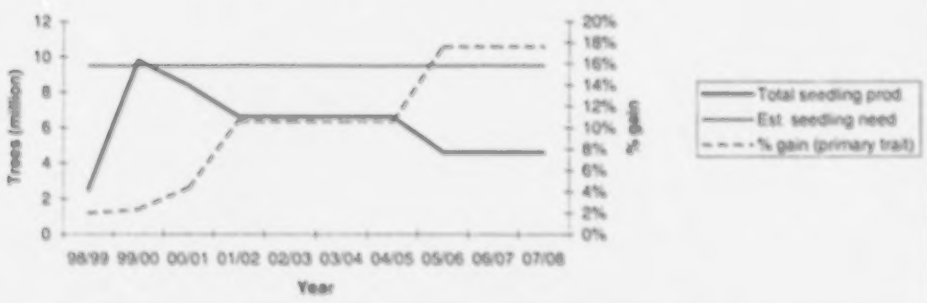
Seedling need (million):	9.5
Program total value rank:	5

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polln	110	110	110	110	110	110	110	110	110	110
Polycross	251	251	251	251	251	251	251	251	251	251
Clonal										
F1	50	50	50	50	50	50	50	50	50	50
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
305 MoF Kal	0.0	3.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
302 MoF Skm	2.5	6.4	6.4	4.6	4.6	4.6	4.6	2.6	2.6	2.6
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
305 MoF Kal	3%	3%	12%	12%	12%	12%	12%	12%	12%	12%
302 MoF Skm	2%	2%	2%	10%	10%	10%	10%	22%	22%	22%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	2.5	9.8	8.4	6.6	6.6	6.6	6.6	4.6	4.6	4.6
Total gain	2%	2%	4%	11%	11%	11%	11%	18%	18%	18%

EK low orchard 304 seed is suitable for use only in the NEK overlap zone

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 05SxNEhigh 19JULY2000

ORCHARDS

Picea glauca x engelmannii - Interior Spruce (NE, high)

5 Sx NE high 1300-1700 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Kal	306	83	3%	1,000	500	9.0	4,000	**2.0**	
MoF Skim	302	149	2%	1,602	640	11.6	4,000	**2.6**	
		Total ramets		**2,602**	**1,140**	F15	**Total production**	**4.560**	I15

Vegetative propagation	**Stecklings/Emblings**	**0.0** I17
	Total production	**4.6** I19

Orchard 304 is only suitable for the NEK overlap and is not included in this analysis

Total seed use in NEK 1300-1700m averages approx. 200,000 per year.

Annual planting	**9.500** I21	
Deficit	**-4.940** I22	I19-I21
Ramets required	**2,375** I23	I21*1,000,000/F27
Ramets required with over-capacity	**2,850** I24	I23*1.2
Projected necessary expansion	**1,710**	I24-F15 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F27
Planned over-production capacity = 1.2		
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: Orchard expansion required

File: 05SxNEhigh 19JULY2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (NE, high)

5 Sx NE high 1300-1700 m										Annual planting million	
Prog. Tot Value Rank 5/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	9.500	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets
2 Mating		20								Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish		5								Progeny tests establ. to design specifications	Number of test sites
3 Maintain										Progeny test trees free-growing	Number of test sites maintained
4 Measure		3								Sites measured as in strategy	Number of test sites measured
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1											
2											
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production		Depends upon decision on the use of SO 304 seed									
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		400								Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Rogung		400								Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP		245								Genetic gain for primary trait	Number of ramets treated
5 Induction										Orchard production	Number of ramets induced
6 Orchard management/holding beds		2,218								Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control		1,987								Full orchard production	Number of ramets treated
2 Disease control										Full orchard production	Number of ramets treated
3 Monitoring		1,987								Full orchard production	Number of ramets monitored
350 Technical Support											
1 Nelson timber supply analysis		1 report								Understanding timber supply implications	Report
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File 05SxNEhigh 19JULY2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (NE, high)

5 Sx NE high 1300-1700 m										
Prog. Tot Value Rank 5/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0 / 0.0
220 Breed Arboreta & Mating										
1 Breeding arboreta (remeas)										0.0
2 Mating		2.0								2.0 / 2.0
230 Progeny testing										
1 Design										0.0
2 Establish										0.0
3 Maintain		8.0								8.0
4 Measure		10.6								10.6
5 Analyze										0.0 / 18.6
240 Technical Support										
1										0.0
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0 / 0.0
	0.0	20.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Sub-TOT 20.6
300 SEED PRODUCTION										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0 / 0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement		2.1								2.1
2 Ramet replacement										0.0
3 Rogging		2.1								2.1
4 SMP / CP		2.1								2.1
5 Induction										0.0
6 Orchard management/rotating beds		3.2								3.2 / 9.6
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 IE										0.0
3 Other										0.0 / 0.0
340 Pest Management										
1 Insect control		3.2								3.2
2 Disease control										0.0
3 Monitoring		3.2								3.2 / 6.4
350 Technical Support										
1 Nelson timber supply analysis		5.0								5.0
2										0.0
3										0.0
4										0.0
5										0.0 / 5.0
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	0.0	41.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.7 / 41.7

14	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 14SxPGlow24JULY2000

Picea glauca x engelmannii - Interior Spruce (PG, low)

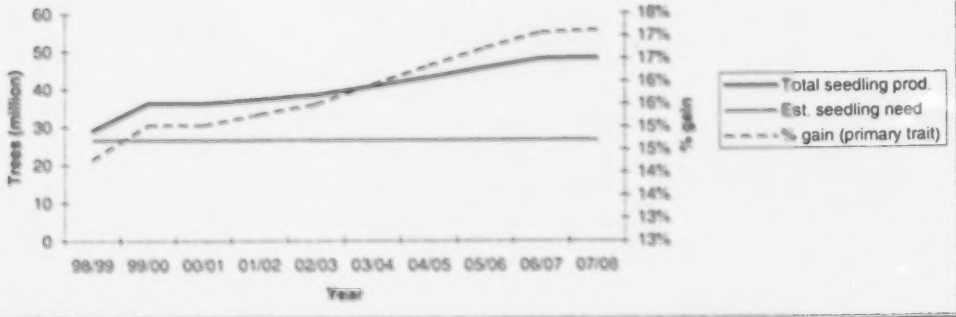
Sx PG low **< 1200 m**

Seedling need (million):	28.5
Program total value rank:	14

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Polycross										
Clonal										
F1	87	87	87	87	87	87	87	87	87	87
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
209 MoF Kal	0.0	1.0	1.0	1.0	1.0	1.0	1.2	1.4	1.6	1.8
205 MoF Skm	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
206 MoF Skm	4.0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
211 VSOC	0.0	0.0	0.0	1.1	2.2	4.5	6.7	9.0	11.2	11.2
214 VSOC	20.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
614 MoF Kal	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
209 MoF Kal	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%
205 MoF Skm	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
206 MoF Skm	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
211 VSOC	23%	23%	23%	23%	23%	23%	23%	23%	23%	23%
214 VSOC	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
614 MoF Kal	23%	23%	23%	23%	23%	23%	23%	23%	23%	23%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	29.0	36.1	36.1	37.2	38.3	40.6	43.0	45.5	47.9	48.1
Total gain	14%	15%	15%	15%	15%	16%	16%	17%	17%	17%

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 14SxPGlow24JULY2000

ORCHARDS

Picea glauca x engelmannii - Interior Spruce (PG, low)

14 Sx PG low < 1200 m

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Kal	209	35	29.0%	753	233	4.2	4,000	**0.9**	I8
MoF Skim	205	160	6.0%	1,517	1,250	22.6	4,000	**5.0**	
MoF Skim	206	38	6%	3,917	1,220	22.1	4,000	**4.9**	
VSOC	211	81	23%	4,300	4,300	77.8	4,000	**17.2**	
VSOC	214	45	18%	4,345	4,345	78.6	4,000	**17.4**	
MoF Kal	614	17	23%	187	185	3.3	4,000	**0.7**	
									I15
		Total ramets		**15,019**	**11,533**	F16	**Total production**	**46.132**	I16

SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0** I18
	Total production	**46.1** I20

I16+I18+I20

Annual planting	**26.500**	I22
Surplus	**19.632**	I23
Ramets required	**6,625**	I24
Ramets required with over-capacity	**7,950**	I25
Projected necessary expansion	**0**	

I20-I22

I22*1,000,000/F28

I24*F29

I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F28
Planned over-production capacity = 1.2		F29
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: Projected surplus should allow roguing for gain and selection on other traits (e.g. weevil resistance)

File: 14SxPGlow24JULY2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (PG, low)

14 Sx PG low < 1200 m										Annual planting million		
Prog. Tot Value Rank 14/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	26.500		
200 BREEDING PROGRAMS	KEY PERFORMANCE INDICATORS (KPI)									KEY SUCCESS FACTORS		KPI DESCRIPTION
210 Selection												
› Families selected for breeding arboreta								X		Advanced generation selections made		Number of selections made
220 Breed Arboreta & Mating												
› Breeding arboreta (ramets)	X	40	X	X	X				X	Breeding populations established		Number of ramets
› Mating										Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
› Design						X				Strategic and efficient mating and test design		Year design finalized
› Establish	X	6	X	X	X	X	X	X	X	Progeny tests establ. to design specifications		Number of test sites
› Maintain		3	X	X	X	X	X			Progeny test trees free-growing		Number of test sites maintained
› Measure										Sites measured as in strategy		Number of test sites measured
› Analyze										Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
› Wood density				X	X		X					
› Weevil screening												
› Realized gain trials				X								
›												
›												
›												
300 SEED PRODUCTION												
310 Expanded Production												
› Grafting for new or expanded orchards										Full production capacity		Number of grafts made
› New orchards										Full production capacity		Number of ramets established
› Orchard expansions										Full production capacity		Number of ramets established
› Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
› Grafting for ramet replacement			X							Ramets available for replacement		Number of grafts made
› Ramet replacement		100	X							Genetic gain for primary trait		Number of ramets replaced
› Roguing		595	X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets rogued
› SMP / CP		800	X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets treated
› Induction		1,850	X	X	X	X	X	X	X	Orchard production		Number of ramets induced
› Orchard management/hotring beds		935								Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
› Rooted cuttings			X	X	X	X	X	X	X	High genetic worth materials bulked up		Millions of rooted cuttings produced
› SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
› Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
› Insect control		8,989	X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
› Disease control		8,987	X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
› Monitoring		346	X	X	X	X	X	X	X	Full orchard production		Number of ramets monitored
350 Technical Support												
› Phenology assessment		1 report								Orchard production increases		1 report (400 ramets assessed)
›												
› SE demonstration sites		1 report								Effective extension of SE technology		1 report 5/10 sites signed for demonstration
› Seed orchard after effects		1 report								Growth data to measure so after effects		1 report (trials with 390 seedlots)
› DNA markers		1 report								DNA markers available for seedlot rating		1 report 4 markers for spuce & 6 for western larch
›												
	Past Yr	Current Yr	Next Yr									

File: 14SxPGlow24JULY2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (PG, low)

14 Sx PG low < 1200 m											
Prog. Tot Value Rank: 14/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS	
210 Selection								100.0		100.0	
› Families selected for breeding arboreta											*100.0*
220 Breed Arboreta & Mating									100.0	100.0	
› Breeding arboreta (ramets)	50.0	5.9	75.0	75.0	75.0					280.9	
› Mating											*380.9*
230 Progeny testing										0.0	
› Design						3.0				3.0	
› Establish	3.0	46.0	10.0	11.0	12.0	7.0	17.0	6.0	6.0	118.0	
› Maintain		40.0	5.0	8.0	8.0	2.0	14.0			77.0	
› Measure										0.0	
› Analyze											*196.0*
240 Technical Support											
› Wood density				1.0	1.0		1.0			3.0	
› Weevil screening										0.0	
› Realized gain trials				2.0						2.0	
›										0.0	
›										0.0	
›										0.0	*5.0*
	53.0	91.9	90.0	97.0	96.0	12.0	32.0	106.0	106.0	*Sub-TOT*	*683.9*
300 SEED PRODUCTION											
310 Expanded Production										0.0	
› Grafting for new or expanded orchards										0.0	
› New orchards										0.0	
› Orchard isolations										0.0	
› Orchard management											*0.0*
320 Quality/Quantity Boosts										0.0	
› Grafting for ramet replacement		0.0	X							4.3	
› Ramet replacement		4.3	X							2.9	
› Roguing		2.9	X	X	X	X	X	X	X	2.0	
› SMP / CP		2.0	X	X	X	X	X	X	X	3.3	
› Induction		3.3	X	X	X	X	X	X	X	6.4	
› Orchard management/holding beds		6.4									*18.875*
330 Vegetative Propagation										0.0	
› Rooted cuttings		0.0	X	X	X	X	X	X	X	0.0	
› SE		0.0								0.0	
› Other		0.0									*0.009*
340 Pest Management										7.2	
› Insect control		7.2	X	X	X	X	X	X	X	4.1	
› Disease control		4.1	X	X	X	X	X	X	X	5.8	
› Monitoring		5.8	X	X	X	X	X	X	X		*16.817*
350 Technical Support										2.0	
› Phenology assessment	X	2.0	X		X		X			0.0	
›										24.1	
› SE demonstration sites		24.1								42.0	
› Seed orchard after effects		42.0								34.1	
› DNA markers		34.1									
›											*102.271*
SUB TOT	0.0	138.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*Sub-TOT*	*138.1*
GRAND TOTALS	53.0	230.0	90.0	97.0	96.0	12.0	32.0	106.0	106.0	822.0	822.0

25	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 25SxEKlow 25JULY2000

Sx EK low **< 1700 m**

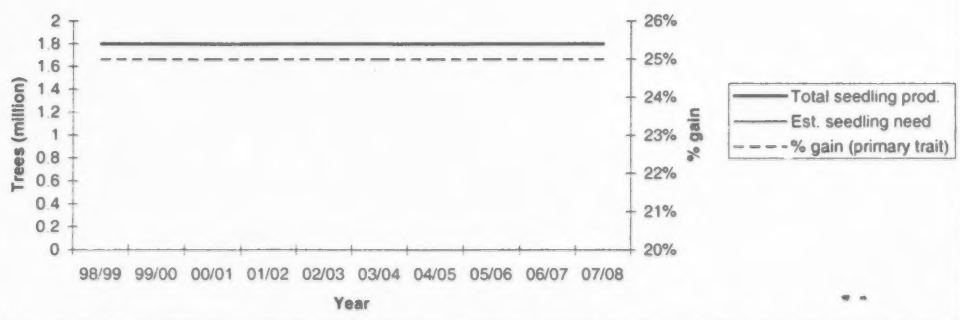
Picea glauca x engelmannii - Interior Spruce (EK, low)

Seedling need (million): 1.8
Program total value rank: 25

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	110	110	110	110	110	110	110	110	110	110
Polycross										
Clonal										
F1	55	55	55	55	55	55	55	55	55	55
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
304 MoF Kal	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
304 MoF Kal	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total gain	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 25SxEKlow 25JULY2000

ORCHARDS

***Picea glauca x engelmannii* - Interior Spruce (EK, low)**

25 Sx EK low **< 1700 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Kal	304	38	25.0%	450*	450	8.1	4,000	**1.8**	I8
				*Only a portion					
				of 304 Kal's ramets					
									I15
		Total ramets		**0**	**450**	F16	**Total production**	**1.800**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**1.8**	I20 I16+I18+I20

Annual planting	**1.800**	I22	
Deficit	**0.000**	I23	I20-I22
Ramets required	**450**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**540**	I25	I24*F29
Projected necessary expansion	**90**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F28
Planned over-production capacity = 1.2		F29
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: All of SPZ needs can be met from orchard 304.

File 25SxEKlow 25JULY2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (EK, low)

25 Sx EK low < 1700 m										Annual planting million	
Prog. Tot Value Rank 25/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	1.800	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta								50		Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets
2 Mating		20								Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish										Progeny tests establ. to design specifications	Number of test sites
3 Maintain	3	4	8	3	3	3	3	3		Progeny test trees free-growing	Number of test sites maintained
4 Measure	3	1		3		11		3		Sites measured as in strategy	Number of test sites measured
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1 Wood density			4							Sites assessed as in strategy	Number of test sites assessed
2 Wood screening				3	1					Sites assessed as in strategy	Number of test sites assessed
3 Prov test maintenance										Test trees free-growing	Number of test sites maintained
4 Orchard seed gain tests			3M	3M		3ME				Orchard GW established	Test sites Establ., Maint., MEasured
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		100								Ramets available for replacement	Number of grafts made
2 Ramet replacement		500	X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets replaced
3 Rogueing			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets treated
5 Induction			X	X	X	X	X	X	X	Orchard production	Number of ramets induced
6 Orchard management/holding beds		1,827	X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control		1,655	X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring		1,655	X	X	X	X	X	X	X	Full orchard production	Number of ramets surveyed
350 Technical Support											
1											
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File 25SxEKlow 25JULY2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (EK, low)

25 Sx EK low < 1700 m										
Prog. Tot Value Rank 25/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection								5.0		5.0 / *5.0*
220 Breed Arboreta & Mating		2.7								0.0 / 2.7 / *2.7*
230 Progeny testing	20.0 / 20.0	24.0 / 12.0	40.0	15.0 / 20.0	15.0	15.0 / 40.0	15.0	15.0 / 20.0		0.0 / 0.0 / 159.0 / 112.0 / 0.0 / *271.0*
240 Technical Support			30.0	40.0	15.0	10.0				30.0 / 55.0 / 0.0 / 10.0 / 0.0 / 0.0 / *95.0*
	40.0	38.7	70.0	75.0	30.0	65.0	15.0	40.0	0.0	*Sub-TOT* *373.7*
300 SEED PRODUCTION										
310 Expanded Production										0.0 / 0.0 / 0.0 / 0.0 / *0.0*
320 Quality/Quantity Boosts		1.8 / 1.8 / 1.8	X / X / X	X / X / X	X / X / X	X / X / X	X / X / X	X / X / X	X / X / X	0.0 / 1.8 / 1.8 / 0.0 / 0.0 / 1.8 / *5.4*
330 Vegetative Propagation										0.0 / 0.0 / 0.0 / *0.0*
340 Pest Management		1.8 / 1.8	X / X / X	X / X / X	X / X / X	X / X / X	X / X / X	X / X / X	X / X / X	1.8 / 0.0 / 1.8 / *3.6*
350 Technical Support										*0.0*
Sub Tot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	40.0	47.8	70.0	75.0	30.0	65.0	15.0	40.0	0.0	382.8 / 382.8

28 GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 28SxTOhi19JULY2000

Picea glauca x engelmannii - Interior Spruce (TO, high)

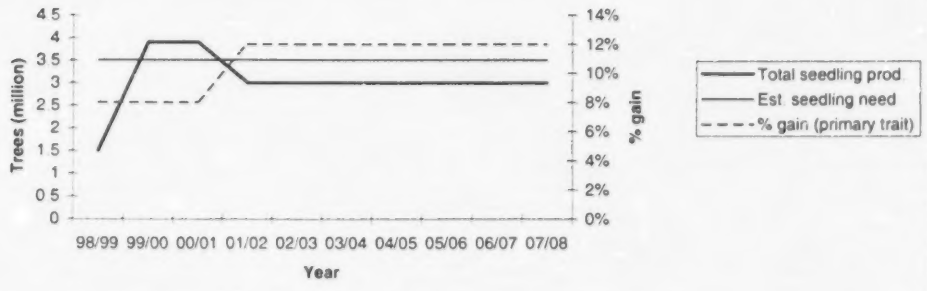
Sx TO high **1300-1850 m**

Seedling need (million):	3.5
Program total value rank:	28

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
Parents in progeny test:										
Open pollin										
Polycross	135	135	135	135	135	135	135	135	135	135
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
303 Riverside FP	1.5	3.9	3.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0
SO 303 may be adjusted for low elevation only										
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
303 Riverside FP	8%	8%	8%	12%	12%	12%	12%	12%	12%	12%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	1.5	3.9	3.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Total gain	8%	8%	8%	12%	12%	12%	12%	12%	12%	12%

Estimated gain and production



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 28SxTOhi19JULY2000

ORCHARDS

***Picea glauca x engelmannii* - Interior Spruce (TO, high)**

28 Sx TO high **1300-1850 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod million seedlings	
Riverside FP	303	242	8%	2,058	750	13.6	4,000	3.0	I8
	75% of capacity			Old zone					
	303 feeds TO			was TOA					
	high			and TOD					
									I15
		Total ramets		**2,058**	**750**	F16	**Total production**	**3.000**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**3.0**	I20 I16+I18+I20

Annual planting	**3.498**	I22	
Deficit	**-0.498**	I23	I20-I22
Ramets required	**875**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**1,049**	I25	I24*F29
Projected necessary expansion	**299**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F28
Planned over-production capacity = 1.2		F29
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions:

File: 28SxTOhi19JULY2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (TO, high)

28 Sx TO high 1300-1850 m										Annual planting million		
Prog. Tot Value Rank 28/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	3.458		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**PERFORMANCE INDICATORS**	
210 Selection › Families selected for breeding arboreta										Advanced generation selections made	Number of selections made	
220 Breed. Arboreta & Mating › Breeding arboreta (ramets) › Mating		20	75	75	75					Breeding populations established Breeding strategy crosses made on time	Number of ramets Number of crosses	
230 Progeny testing › Design › Establish › Maintain › Measure › Analyze		 2 2					3	3	3	Strategic and efficient mating and test design Progeny tests establ. to design specifications Progeny test trees free-growing Sites measured as in strategy Test data analysis does not delay selections	Year design finalized Number of test sites Number of test sites maintained Number of test sites measured Number of test series analyzed	
240 Technical Support › › › › ›												
300 SEED PRODUCTION												
310 Expanded Production › Grafting for new or expanded orchards › New orchards › Orchard expansions › Orchard management			X X	 X X	 X X	 X	 X	 X	 X	Full production capacity Full production capacity Full production capacity Productive orchard (higher GW seedlots)	Number of grafts made Number of ramets established Number of ramets established Number of ramets maintained	
320 Quality/Quantity Boosts › Grafting for ramet replacement › Ramet replacement › Rogueing › SMP / CP › Induction › Orchard management/hedging tests		300 252 363 1,854 500	 X X X X	 X X X X	 X X X X	 X X X X	 X X X X	 X X X X	 X X X X	Ramets available for replacement Genetic gain for primary trait Genetic gain for primary trait Genetic gain for primary trait Orchard production Productive orchard	Number of grafts made Number of ramets replaced Number of ramets rogued Number of ramets treated Number of ramets induced Number of ramets maintained	
330 Vegetative Propagation › Rooted cuttings › SE › Other										High genetic worth materials bulked up High genetic worth materials bulked up High genetic worth materials bulked up	Millions of rooted cuttings produced Thousands of somatic seedlings produced Numbers of propagules produced	
340 Pest Management › Insect control › Disease control › Monitoring		1,094	X X X	X X X	X X X	X X X	X X X	X X X	X X X	Full orchard production Full orchard production Full orchard production	Number of ramets treated Number of ramets treated Number of ramets surveyed	
350 Technical Support › Cone and seed pest bioeds › › › ›			X							Full orchard production	Orchard mgt. recommendations	
	Past Yr	Current Yr	Next Yr									

File: 28SxTOhi19JULY2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (TO, high)

28 Sx TO high 1300-1850 m Prog. Tot Value Rank 28/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$										
210 Selection										0.0	
1 Families selected for breeding arboreta											0.0
220 Breed Arboreta & Mating										0.0	
1 Breeding arboreta (remeas)										0.0	
2 Mating		3.0	10.0	10.0	10.0					33.0	
											33.0
230 Progeny testing											
1 Design							50.0			0.0	
2 Establish								15.0	15.0	50.0	
3 Maintain		9.0								39.0	
4 Measure		24.3								24.3	
5 Analyze										0.0	
											113.3
240 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	0.0
	0.0	36.3	10.0	10.0	10.0	0.0	50.0	15.0	15.0	Sub-TOT	146.3
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards			X	X						0.0	
2 New orchards			X	X	X					0.0	
3 Orchard expansions			X	X	X					0.0	
4 Orchard management				X	X	X	X	X	X	0.0	
											0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement		4.4								4.4	
2 Ramet replacement		4.4								4.4	
3 Roguing		4.4	X	X						4.4	
4 SMP / CP		4.4	X	X	X	X	X	X	X	4.4	
5 Induction		4.4	X	X	X	X	X	X	X	4.4	
6 Orchard management/holding beds			X	X	X	X	X	X	X	0.0	
											22.2
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	
											0.0
340 Pest Management											
1 Insect control		1.9	X	X	X	X	X	X	X	1.9	
2 Disease control			X	X	X	X	X	X	X	0.0	
3 Monitoring			X	X	X	X	X	X	X	0.0	
											1.9
350 Technical Support											
1 Cone and seed prod boosts			X							0.0	
2										0.0	
3										0.0	
4											
5											
6											0.0
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	24.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	0.0	60.5	10.0	10.0	10.0	0.0	50.0	15.0	15.0	170.5	170.5

30	GENETIC IMPROVEMENT STRATEGY TIMELINE

File 30SxTOlow28JULY2000.xls

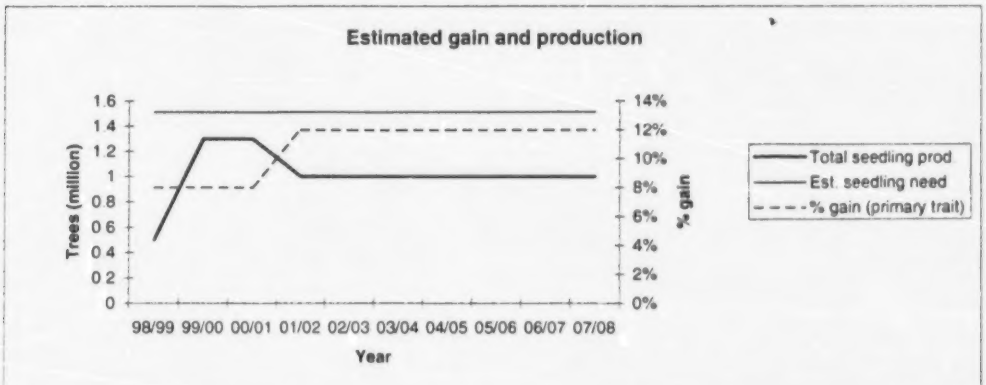
Picea glauca x engelmannii - Interior Spruce (TO, low)

Sx TO low **< 1300 m**

Seedling need (million):	1.5
Program total value rank:	30

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin										
Polycross										
Clonal	Review of progeny tests underway to accommodate change in seed zone									
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
303 Riverside FP	0.5	1.3	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Orchard 303 may be restructured to produce low elevation seed only										
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
303 Riverside FP	8%	8%	8%	12%	12%	12%	12%	12%	12%	12%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.5	1.3	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total gain	8%	8%	8%	12%	12%	12%	12%	12%	12%	12%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File 30SxTOlow28JULY2000.xls

ORCHARDS

Picea glauca x engelmannii - Interior Spruce (TO, low)

30 Sx TO low **< 1300 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings		
Riverside FP	303	242	8%	2,058	250	4.5	4,000	1.0	I8	
				Old zone						
				was TOA						
				and TOD						
								0.0		
								0.0	I15	
		Total ramets		**2,058**	**250**	F16	**Total production**	**1.000**	I16	SUM(I8:I15)
							Stecklings/Emblings	**0.0**	I18	
Note: SO 303 contains low and high elev. Blocks							**Total production**	**1.0**	I20	I16+I18+I20

Annual planting	**1.512**	I22	
Deficit	**-0.512**	I23	I20-I22
Ramets required	**378**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**454**	I25	I24*F29
Projected necessary expansion	**204**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet =	**4,000**	F28
Planned over-production capacity =	**1.2**	F29
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: Orchard to be adjusted to low elevation; requires species committee input

File 30SxTOlow19JULY2000.xls

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (TO, low)

30 Sx TO low < 1300 m Prog. Tot Value Rank 30/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 1.912	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection › Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating › Breeding arboreta (ramets) › Mating		20	75	75	75					Breeding populations established Breeding strategy crosses made on time	Number of ramets Number of crosses
230 Progeny testing › Design › Establish › Maintain › Measure › Analyze	2 2	2 2				4 4	3	3	3	Strategic and efficient mating and test design Progeny tests establ. to design specifications Progeny test trees free-growing Sites measured as in strategy Test data analysis does not delay selections	Year design finalized Number of test sites Number of test sites maintained Number of test sites measured Number of test series analyzed
240 Technical Support › › › › › ›											
300 SEED PRODUCTION											
300 SEED PRODUCTION › Grafting for new or expanded orchards › New orchards › Orchard expansions › Orchard management										Full production capacity Full production capacity Full production capacity Productive orchard (higher GW seedlots)	Number of grafts made Number of ramets established Number of ramets established Number of ramets maintained
320 Quality/Quantity Boosts › Grafting for ramet replacement › Ramet replacement › Rogging › SMP / CP › Induction › Orchard management/rehabing trees			X X X X X X	X X X X X X	X X X X X	X X	X X	X X	X X	Ramets available for replacement Genetic gain for primary trait Genetic gain for primary trait Genetic gain for primary trait Orchard production Productive orchard	Number of grafts made Number of ramets replaced Number of ramets rogued Number of ramets treated Number of ramets induced Number of ramets maintained
330 Vegetative Propagation › Rooted cuttings › SE › Other			X	X	X	X	X	X	X	High genetic worth materials bulked up High genetic worth materials bulked up High genetic worth materials bulked up	Millions of rooted cuttings produced Thousands of somatic seedlings produced Numbers of propagules produced
340 Pest Management › Insect control › Disease control › Monitoring			X X X	X X X	X X X	X X X	X X X	X X X	X X X	Full orchard production Full orchard production Full orchard production	Number of ramets treated Number of ramets treated Surveys conducted
350 Technical Support › › › › › ›	Past Yr	Current Yr	Next Yr								

File 30SxTOlow19JULY2000.xls

BUDGETS

Picea glauca x engelmannii - Interior Spruce (TO, low)

30 Sx TO low < 1300 m										
Prog. Tot Value Rank 30/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0
										0.0
220 Breed. Arboreta & Mating										
1 Breeding arboreta (ramets)										0.0
2 Mating		3.0	10.0	10.0	10.0					33.0
										33.0
230 Progeny testing										
1 Design										0.0
2 Establish							50.0			50.0
3 Maintain	10.0	32.0				20.0		15.0	15.0	92.0
4 Measure	10.0	11.0				20.0				41.0
5 Analyze										0.0
										183.0
240 Technical Support										
1										0.0
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0 *0.0*
SUB TOT	20.0	46.0	10.0	10.0	10.0	40.0	50.0	15.0	15.0	*Sub-TOT* *216.0*
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards										0.0
2 New orchards										0.0
3 Orchard expansions										0.0
4 Orchard management										0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement			X	X						0.0
2 Ramet replacement			X	X	X					0.0
3 Rogueing			X	X	X					0.0
4 SMP / CP			X	X	X	X	X	X	X	0.0
5 Induction			X	X	X	X	X	X	X	0.0
6 Orchard management/holding beds			X	X	X	X	X	X	X	0.0
										0.0
330 Vegetative Propagation										
1 Rooted cuttings			X	X	X	X	X	X	X	0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control			X	X	X	X	X	X	X	0.0
2 Disease control			X	X	X	X	X	X	X	0.0
3 Monitoring			X	X	X	X	X	X	X	0.0
										0.0
350 Technical Support										
1										0.0
2										0.0
3										0.0
4										
5										
6										
	Past Yr	Current Yr	Next Yr							*0.0*
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	**20.0**	**46.0**	**10.0**	**10.0**	**10.0**	**40.0**	**50.0**	**15.0**	**15.0**	**216.0** **216.0**

35	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 35SxBVlow19JULY2000

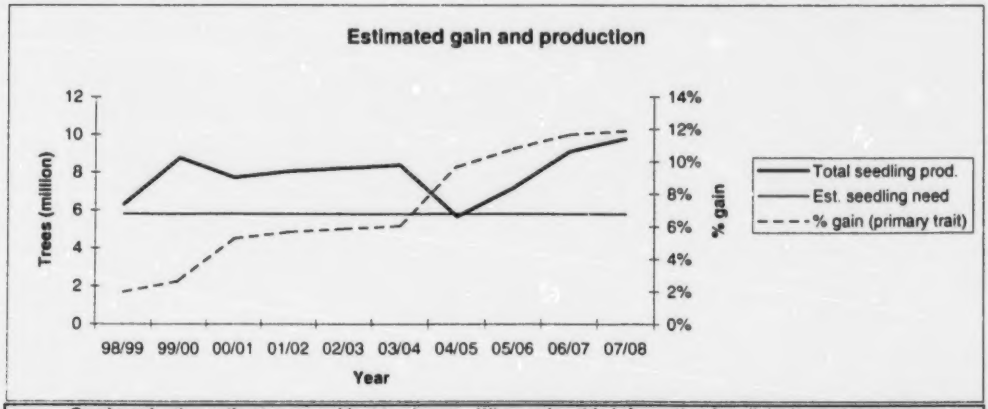
Picea glauca x engelmannii - Interior Spruce (BV, low)

Sx BV low **< 1200 m**

Seedling need (million):	5.8
Program total value rank:	35

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin	294	294	294	294	294	294	294	294	294	294
Polycross										
Clonal										
F1	68	68	68	68	68	68	68	68	68	68
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
207 MoF Skim	3.1	4.0	3.2	3.2	3.2	3.2	2.0	2.0	2.0	2.0
208 MoF Skim	3.2	4.3	3.6	3.6	3.6	3.6	1.8	1.8	1.8	1.8
229 MoF Skim	0.0	0.4	0.6	0.7	0.8	0.9	1.1	2.4	3.2	3.2
820 MoF Kal	0.0	0.1	0.3	0.6	0.6	0.7	0.8	1.0	2.1	2.8
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
207 MoF Skim	3%	3%	5%	5%	5%	5%	8%	8%	8%	8%
208 MoF Skim	1%	1%	3%	3%	3%	3%	6%	6%	6%	6%
229 MoF Skim	11%	15%	15%	15%	15%	15%	15%	15%	15%	15%
820 MoF Kal	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	6.3	8.8	7.7	8.1	8.2	8.4	5.7	7.2	9.1	9.8
Total gain	2%	3%	5%	6%	6%	6%	10%	11%	12%	12%


Estimated gain and production
Trees (million)
% gain
Year
98/99 99/00 00/01 01/02 02/03 03/04 04/05 05/06 06/07 07/08
0 2 4 6 8 10 12
0% 2% 4% 6% 8% 10% 12% 14%
Total seedling prod.
Est. seedling need
% gain (primary trait)

Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 35SxBVlow19JULY2000

ORCHARDS

***Picea glauca x engelmannii* - Interior Spruce (BV, low)**

35 Sx BV low **< 1200 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Skim	207	130	3%	998	500	9.0	4,000	**2.0**	I8
MoF Skim	208	136	2%	1,072	450	8.1	4,000	**1.8**	
MoF Skim	229*	136?	15%	994	800	14.5	4,000	**3.2**	
MoF Kal	620*	36	15%	720	700	12.7	4,000	**2.8**	
	* not licenced								
								0.0	
								0.0	I15
		Total ramets		**3,784**	**2,450**	F16	**Total production**	**9.800**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**9.8**	I20 I16+I18+I20

Annual planting	**5.798**	I22	
Surplus	**4.002**	I23	I20-I22
Ramets required	**1,450**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**1,739**	I25	I24*F29
Projected necessary expansion	**0**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F28
Planned over-production capacity = 1.2		F29
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: Lower gain orchards 207 & 208 could be retired when 229 and 620 reach full production.

File: 35SxBVlow19JULY2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (BV, low)

35 Sx BV low < 1200 m										Annual planting million		
Prog. Tot Value Rank: 35/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	5.796		
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**		**KPI DESCRIPTION**
210 Selection												
1 Families selected for breeding arboreta										Advanced generation selections made		Number of selections made
220 Breed. Arboreta & Mating												
1 Breeding arboreta (ramets)										Breeding populations established		Number of ramets
2 Mating		10	75	75	75					Breeding strategy crosses made on time		Number of crosses
230 Progeny testing												
1 Design										Strategic and efficient mating and test design		Year design finalized
2 Establish	3						3			Progeny tests establ. to design specifications		Number of test sites
3 Maintain	3	3	3		5	3		3	3	Progeny test trees free-growing		Number of test sites maintained
4 Measure			3		5	3				Sites measured as in strategy		Number of test sites measured
5 Analyze										Test data analysis does not delay selections		Number of test series analyzed
240 Technical Support												
1 Wood density										Parental wood density BV's available		Number of sites assessed
2 Research dallol	1			1			1			Genetic components understood		Report on genetic components
3												
4												
5												
6												
300 SEED PRODUCTION												
310 Expanded Production												
1 Grafting for new or expanded orchards										Full production capacity		Number of grafts made
2 New orchards										Full production capacity		Number of ramets established
3 Orchard expansions										Full production capacity		Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)		Number of ramets maintained
320 Quality/Quantity Boosts												
1 Grafting for ramet replacement										Ramets available for replacement		Number of grafts made
2 Ramet replacement										Genetic gain for primary trait		Number of ramets replaced
3 Roguing		300	X	X	X					Genetic gain for primary trait		Number of ramets rogued
4 SMP / CP		363	X	X	X	X	X	X	X	Genetic gain for primary trait		Number of ramets treated
5 Induction		650	X	X	X	X	X	X	X	Orchard production		Number of ramets induced
6 Orchard management/holding beds		769	X	X	X	X	X	X	X	Productive orchard		Number of ramets maintained
330 Vegetative Propagation												
1 Rooted cuttings										High genetic worth materials bulked up		Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up		Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up		Numbers of propagules produced
340 Pest Management												
1 Insect control		666	X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production		Number of ramets treated
3 Monitoring		669	X	X	X	X	X	X	X	Full orchard production		Number of ramets surveyed
350 Technical Support												
1 Crown management		1 report								Effective crown management		Report
2												
3												
4												
5												
6	Past Yr	Current Yr	Next Yr									

File: 35SxBVlow19JULY2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (BV, low)

35 Sx BV low < 1200 m Prog. Tot Value Rank 35/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	TOTALS
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									
210 Selection										0.0
1 Families selected for breeding arboreta										*0.0*
220 Breed. Arboreta & Mating										0.0
1 Breeding arboreta (ramets)		1.0	10.0	10.0	10.0					31.0
2 Mating										*31.0*
230 Progeny testing										0.0
1 Design	40.0						50.0			90.0
2 Establish	10.0	19.6	15.0		20.0	15.0		15.0	15.0	109.6
3 Maintain	10.0		15.0		40.0	15.0				80.0
4 Measure										0.0
5 Analyze										*279.6*
240 Technical Support										0.0
1 Wood density	5.0			5.0			5.0			15.0
2 Research dwfld										0.0
3										0.0
4										0.0
5										0.0
6										*15.0*
	65.0	20.6	40.0	15.0	70.0	30.0	55.0	15.0	15.0	*Sub-TOT* *325.6*
300 SEED PRODUCTION										
310 Expanded Production				x						0.0
1 Grafting for new or expanded orchards					x					0.0
2 New orchards										0.0
3 Orchard expansions						x	x	x	x	0.0
4 Orchard management										*0.0*
320 Quality/Quantity Boosts		0.0								0.0
1 Grafting for ramet replacement		0.0								0.0
2 Ramet replacement		2.7								2.7
3 Rogung	x	3.3	x	x	x	x	x	x	x	3.3
4 SMP / CP	x	2.7	x	x	x	x	x	x	x	2.7
5 Induction	x	0.6	x	x	x	x	x	x	x	0.6
6 Orchard management/holding beds										*9.2*
330 Vegetative Propagation		0.0								0.0
1 Rooted cuttings		0.0								0.0
2 SE		0.0								0.0
3 Other										*0.0*
340 Pest Management		0.6								0.6
1 Insect control		0.0								0.0
2 Disease control	x	3.3	x	x	x	x	x	x	x	3.3
3 Monitoring										*3.9*
350 Technical Support		2.0								2.0
1 Crown management										
2										
3										
4										
5										
6										*2.0*
	Past Yr	Current Yr	Next Yr							
SUB TOT	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	**65.0**	**35.6**	**40.0**	**15.0**	**70.0**	**30.0**	**55.0**	**15.0**	**15.0**	**340.6** **340.6**

40 GENETIC IMPROVEMENT STRATEGY TIMELINE

File 40SxPRlow20JULY2000

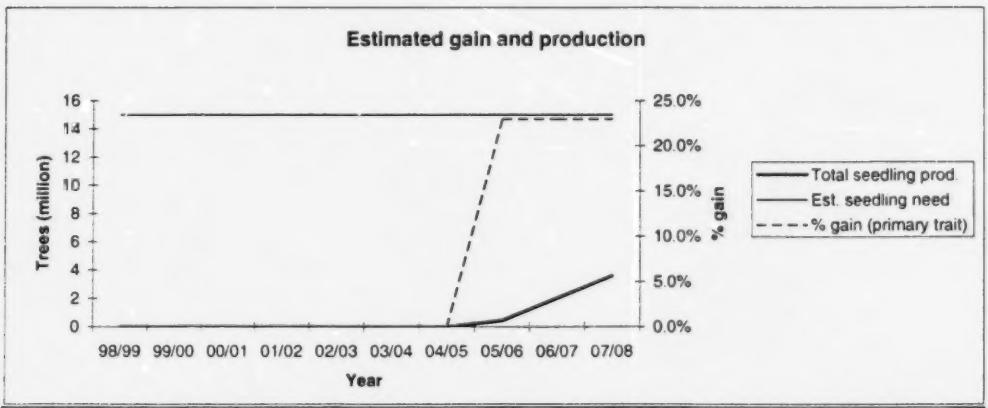
Picea glauca x engelmannii - Interior Spruce (PR, low)

Sx PR low **< 1200 m**

Seedling need (million):	15.0
Program total value rank:	40

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open pollin	351	351	351	351	351	351	351	351	351	351
Polycross										
Clonal										
F1										
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
Skimikin			0.0	0.0	0.0	0.0	0.0	0.5	2.0	3.6
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
Skimikin								23%	23%	23%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.0	3.6
Total gain			0%	0%	0%	0%	0%	23%	23%	23%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 40SxPRlow20JULY2000

ORCHARDS

Picea glauca x engelmannii **- Interior Spruce (PR, low)**

40 Sx PR low **< 1200 m**

Orchard location	Orchard number	Number of clones	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings		
Skimikin (MoF)	212			2,875	2,875	52.0	4,000	**11.5**	I8	
								0.0		
								0.0		
								0.0		
								0.0		
								0.0		
								0.0		
								0.0	I15	
		Total ramets		**2,875**	**2,875**	F16	**Total production**	**11.500**	I16	SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
SO212 was partially planted in spring 2000; remaining stock in holding beds	**Total production**	**11.5**	I20 I16+I18+I20

Annual planting	**15.000**	I22	
Deficit	**-3.500**	I23	I20-I22
Ramets required	**3,750**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**4,500**	I25	I24*F29
Projected necessary expansion	**1,625**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F28
Planned over-production capacity = 1.2		F29
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: Additional orchard capacity needs to be established following further testing to confirm the use of material from the southern PR zone (old Hudsons Hope), in the northern PR zone (old Fort Nelson)

File 40SxPRlow20JULY2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (PR, low)

40 Sx PR low < 1200 m Prog. Tot Value Rank 40/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 15.000	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets (1000)
2 Mating							75	75	75	Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish	4	5								Progeny tests establ. to design specifications	Number of test sites
3 Maintain		4	5	5		5		5		Progeny test trees free-growing	Number of test sites maintained
4 Measure			4			4				Sites measured as in strategy	Number of test sites measured
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1											
2											
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards						X	X			Full production capacity	Number of grafts made
2 New orchards							X	X		Full production capacity	Number of ramets established
3 Orchard expansions							X	X	X	Full production capacity	Number of ramets established
4 Orchard management								X	X	Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement										Ramets available for replacement	Number of grafts made
2 Ramet replacement										Genetic gain for primary trait	Number of ramets replaced
3 Roguing										Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP							X	X	X	Genetic gain for primary trait	Number of ramets treated
5 Induction							X	X	X	Orchard production	Number of ramets induced
6 Orchard management/holding beds							X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring			X	X	X	X	X	X	X	Full orchard production	Surveys conducted
350 Technical Support											
1											
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

File 40SxPRlow20JULY2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (PR, low)

40 Sx PR low < 1200 m	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Prog. Tot Value Rank 40/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	
200 BREEDING PROGRAMS	FRBC BUDGETS '000$									TOTALS
210 Selection										
1 Families selected for breeding arboreta										0.0
										0.0
220 Breed Arboreta & Mating										
1 Breeding arboreta (ramets)										0.0
2 Mating							10.0	10.0	10.0	30.0
										30.0
230 Progeny testing										
1 Design										0.0
2 Establish	35.0	12.0								47.0
3 Maintain		36.4	20.0	20.0		20.0		20.0		116.4
4 Measure			20.0			20.0				40.0
5 Analyze										0.0
										203.4
240 Technical Support										
1										0.0
2										0.0
3										0.0
4										0.0
5										0.0
6										0.0
SUB TOT	35.0	48.4	40.0	20.0	0.0	40.0	10.0	30.0	10.0	*Sub-TOT* *233.4*
300 SEED PRODUCTION										
310 Expanded Production										
1 Grafting for new or expanded orchards	X	X								0.0
2 New orchards		X	X	X	X	X				0.0
3 Orchard expansions		X	X	X						0.0
4 Orchard management			X	X	X	X	X	X	X	0.0
										0.0
320 Quality/Quantity Boosts										
1 Grafting for ramet replacement										0.0
2 Ramet replacement										0.0
3 Rogueing										0.0
4 SMP / CP							X	X	X	0.0
5 Induction							X	X	X	0.0
6 Orchard management/holding beds							X	X	X	0.0
										0.0
330 Vegetative Propagation										
1 Rooted cuttings										0.0
2 SE										0.0
3 Other										0.0
										0.0
340 Pest Management										
1 Insect control			X	X	X	X	X	X	X	0.0
2 Disease control			X	X	X	X	X	X	X	0.0
3 Monitoring			X	X	X	X	X	X	X	0.0
										0.0
350 Technical Support										
1										0.0
2										0.0
3										0.0
4										
5										
6										
										0.0
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GRAND TOTALS	35.0	48.4	40.0	20.0	0.0	40.0	10.0	30.0	10.0	233.4 233.4

42	GENETIC IMPROVEMENT STRATEGY TIMELINE

File: 42SxPGhi19July2000

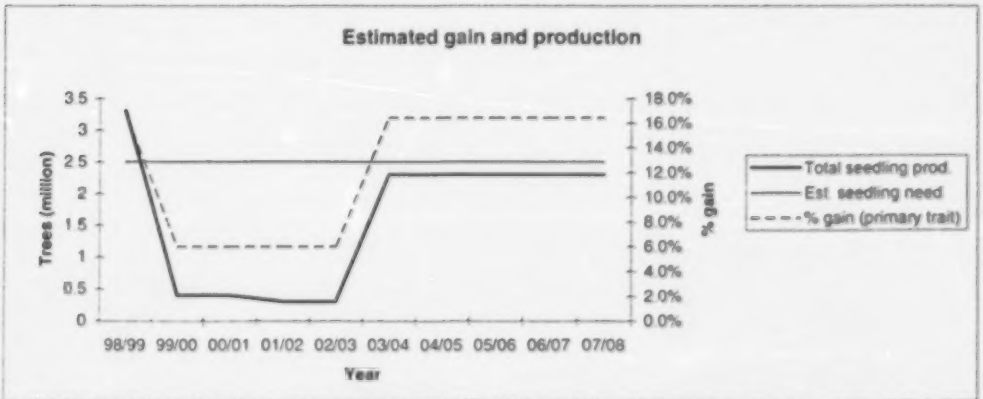
Picea glauca x engelmannii - Interior Spruce (PG, high)

Sx PG high > 1200 m

Seedling need (million):	2.5
Program total value rank:	42

Traits for improvement:	
Primary	Stem volume
Secondary	Wood density, weevil

	Year (April 1 to March 31)									
	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Parents in progeny test:										
Open polin	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080
Polycross										
Clonal										
F1	87	87	87	87	87	87	87	87	87	87
F2										
F3										
Production capabilities (million plantables)										
Orchards (#, owner)										
206 MoF Skim	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
214 VSOC	2.9	0.0	0.0	0.0	0.0	2.0	2.0	2.0	2.0	2.0
Vegetative prod.:										
Phase 1										
Phase 2										
Estimated gain in primary trait										
Orchards (#, owner)										
206 MoF Skim	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
214 VSOC	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Vegetative prod.:										
Phase 1										
Phase 2										
Total Production	3.3	0.4	0.4	0.3	0.3	2.3	2.3	2.3	2.3	2.3
Total gain	17%	6%	6%	6%	6%	16%	16%	16%	16%	16%



Seed production estimates are subject to change. When using this information for silviculture planning or timber supply analysis, contact the Tree Improvement Branch of the Ministry of Forests to confirm data.

File: 42SxPGhi19July2000

ORCHARDS

***Picea glauca x engelmannii* - Interior Spruce (PG, high)**

42 Sx PG high **> 1200 m**

Orchard location	Orchard number	Number of parents	Mean BV 99/00	Planned number of productive ramets	Effective # of Ramets 07/08 (net if replacement)	Target Seed production kg/y at maturity	Target average annual seedling production per ramet at maturity	Total Seedling Prod. million seedlings	
MoF Skim	206	38	6%	3,917	75	1.4	4,000	**0.3**	I8
VSOC	214	45	18%	4,345	500	9.0	4,000	**2.0**	
				Designed	Portion of				
				for PG low	production				
								0.0	I15
		Total ramets		**8,262**	**575**	F16	**Total production**	**2.300**	I16 SUM(I8:I15)

Vegetative propagation	**Stecklings/Emblings**	**0.0**	I18
	Total production	**2.3**	I20 I16+I18+I20

ents are the first to be rogued when ranking families for weevil resistance.
Orchard 214 will be rogued for low elevation use only
Orchard 206 should be rogued and adjusted for high elevation use only

Annual planting	**2.500**	I22	
Deficit	**-0.200**	I23	I20-I22
Ramets required	**625**	I24	I22*1,000,000/F28
Ramets required with over-capacity	**750**	I25	I24*F29
Projected necessary expansion	**175**		I25-F16 if deficit, 0 otherwise

Expected annual average seedling production per ramet = 4,000		F28
Planned over-production capacity = 1.2		F29
Seed weight	402	seeds/g
Seedling recovery factor	0.55	seedlings/seed

Conclusions: New orchard should be established.

File 42SxPGhi29July2000

ACTIVITIES

Picea glauca x engelmannii - Interior Spruce (PG, high)

42 Sx PG high > 1200 m Prog. Tot Value Rank 40/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	Annual planting million 2.500	
200 BREEDING PROGRAMS	**KEY PERFORMANCE INDICATORS (KPI)**									**KEY SUCCESS FACTORS**	**KPI DESCRIPTION**
210 Selection											
1 Families selected for breeding arboreta										Advanced generation selections made	Number of selections made
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										Breeding populations established	Number of ramets (1000)
2 Mating										Breeding strategy crosses made on time	Number of crosses
230 Progeny testing											
1 Design										Strategic and efficient mating and test design	Year design finalized
2 Establish										Progeny tests establ. to design specifications	Number of test sites
3 Maintain										Progeny test trees free-growing	Number of test sites maintained
4 Measure										Sites measured as in strategy	Number of test sites measured
5 Analyze										Test data analysis does not delay selections	Number of test series analyzed
240 Technical Support											
1											
2											
3											
4											
5											
6											
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										Full production capacity	Number of grafts made
2 New orchards										Full production capacity	Number of ramets established
3 Orchard expansions										Full production capacity	Number of ramets established
4 Orchard management										Productive orchard (higher GW seedlots)	Number of ramets maintained
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement			X	X						Ramets available for replacement	Number of grafts made
2 Ramet replacement			X	X						Genetic gain for primary trait	Number of ramets replaced
3 Roguing			X	X						Genetic gain for primary trait	Number of ramets rogued
4 SMP / CP			X	X	X	X	X	X	X	Genetic gain for primary trait	Number of ramets treated
5 Induction			X	X	X	X	X	X	X	Orchard production	Number of ramets induced
6 Orchard management/hubbing beds			X	X	X	X	X	X	X	Productive orchard	Number of ramets maintained
330 Vegetative Propagation											
1 Rooted cuttings										High genetic worth materials bulked up	Millions of rooted cuttings produced
2 SE										High genetic worth materials bulked up	Thousands of somatic seedlings produced
3 Other										High genetic worth materials bulked up	Numbers of propagules produced
340 Pest Management											
1 Insect control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
2 Disease control			X	X	X	X	X	X	X	Full orchard production	Number of ramets treated
3 Monitoring			X	X	X	X	X	X	X	Full orchard production	Surveys conducted
350 Technical Support											
1											
2											
3											
4											
5											
6	Past Yr	Current Yr	Next Yr								

Costs and activities for this zone are included in the Sx PG low seed planning unit

File 42SxPGhi19July2000

BUDGETS

Picea glauca x engelmannii - Interior Spruce (PG, high)

42 Sx PG high > 1200 m											
Prog. Tot Value Rank 40/43	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08		
200 Breeding Programs	FRBC BUDGETS '000$									TOTALS	
210 Selection											
1 Families selected for breeding arboreta										0.0	0.0
220 Breed Arboreta & Mating											
1 Breeding arboreta (ramets)										0.0	
2 Mating										0.0	0.0
230 Progeny testing			Costs and activities for this zone are included int the Sx PG low seed planning unit								
1 Design										0.0	
2 Establish										0.0	
3 Maintain										0.0	
4 Measure										0.0	
5 Analyze										0.0	0.0
240 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4										0.0	
5										0.0	
6										0.0	0.0
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*Sub-TOT*	0.0
300 SEED PRODUCTION											
310 Expanded Production											
1 Grafting for new or expanded orchards										0.0	
2 New orchards										0.0	
3 Orchard expansions										0.0	
4 Orchard management										0.0	0.0
320 Quality/Quantity Boosts											
1 Grafting for ramet replacement			X	X						0.0	
2 Ramet replacement			X	X						0.0	
3 Repeng			X	X						0.0	
4 SMP / CP			X	X	X	X	X	X	X	0.0	
5 Induction			X	X	X	X	X	X	X	0.0	
6 Orchard management/hubbing hosts			X	X	X	X	X	X	X	0.0	0.0
330 Vegetative Propagation											
1 Rooted cuttings										0.0	
2 SE										0.0	
3 Other										0.0	0.0
340 Pest Management											
1 Insect control			X	X	X	X	X	X	X	0.0	
2 Disease control			X	X	X	X	X	X	X	0.0	
3 Monitoring			X	X	X	X	X	X	X	0.0	0.0
350 Technical Support											
1										0.0	
2										0.0	
3										0.0	
4											
5											
6											0.0
	Past Yr	Current Yr	Next Yr								
SUB TOT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
GRAND TOTALS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0